Telephony.

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H. B. McMeal, President F. S. Kenfield, 1st Vice-President
W. H. Graffis, 2d Vice-President H. D. Fargo, Secretary-Treasurer

Edited by H. B. McMeal and Franklin H. Reed

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Determining the Cost of Service.

Executive officers of telephone companies, and auditors, will undoubtedly look forward to the publication of the full text of the report on the method of accounting recently submitted to the City of Chicago, which is empowered to ascertain the cost of each class of service furnished by the Chicago Tel. Co. with keen interest. Information now at hand indicates that it represents a great step in the right direction, and the overcoming, in a practical way, of difficulties which have long been held by telephone men to be insurmountable. The operations of the Chicago Telephone Company are so complex, arising from the number and the diversity of the rates and services, together with the existence of numerous private branch exchanges, and of neighborhood exchanges with resultant complexities of plant and intricacy in details of routine, that they represent a field whose investigation calls for the highest degree of technical skill, tempered with sound common sense.

By keeping closely in view the end to be attained, the experts charged with the task of devising a system of accounts by which it would be made possible to ascertain the cost of giving each separate class of service have been able to obtain a definite result.

It was found essential, in preparing the schedule, to deal to a certain extent in approximations. By estimating, from data which were carefully gathered and analyzed, the value of each of the several factors entering into each determination, it was found to be feasible to off-set one probability of error with another of equal value, but of opposite tendency. By this combination of practical engineering methods with ordinary accounting principles, it is believed that the final result for each section comes close enough to an ideal condition to fulfill the intent of the investigation.

If the system embodied in the present schedule is found to be worthy of adoption, and works well in practice, it will undoubtedly mean that hereafter it will serve as a precedent for similar schedules, at least where the State is given the power of supervision and regulation of rates. Companies in other sections desirous of keeping track of the relation between the service furnished and corresponding rates in several classes will find many valuable hints in this report, even though it deals with a field much more complicated than that in which many companies are engaged.

Relay Testing.

Ever since the advent of the common battery switchboard the telephone relay has been rising in importance. The coming of the automatic system has intensified our interest in relays, since it depends on them even more than does the manual. The fact that a relay works is not enough. To secure reliable service every relay in the office should be adjusted to have a large margin of safety. A clear test revealing the exact condition is therefore a valuable aid.

The method employed in the past involved the use of resistances. Every line relay was expecetd to pull up through from 1100 to 1300 ohms and back down through from 10,000 to 20,000 ohms. Hence, a relay's performance was stated in ohms. This is inaccurate, since a change of voltage vitiates the rating.

The more accurate method now coming into use states the rating in milliamperes, or thousandths of an ampere. "Pull-up current" is a term used to mean the minimum current which will pull the relay up reliably. "Back-down current" means the maximum current which may be flowing in the winding and yet allow the armature to fall back. Only a milliammeter, two resistance boxes and a key are required for testing.

The amount of current required to pull up a relay depends to some extent on what treatment it has had just previous to the test. If the iron be fairly neutral, it will require more current to cause action than if it has just been strongly magnetized. This is due to the sluggishness of iron in losing its magnetic state. As an instance, a certain relay had a pull-up current of 11 milliamperes. A current of 150 milliamperes was passed through it, after which it required only 10 milliamperes to pull it up. After jarring the relay, causing a rearrangement of the molecules, in its iron core, the pull-up current became 11 milliamperes once more.

If the relay coil has been reversed from its usual connection, for a while its pull-up current will be abnormally high. In one case a relay thus reversed required 14 milliamperes to operate, whereas 11 was its normal limit.

The back-down current is also affected by the previous history of the iron. If it has just been strongly magnetized in the same direction, much less current will be required to hold the armature up than if the iron had been in its normal state. This explains why relays which work perfectly under normal conditions sometimes "freeze" for a time after a short circuit has come on the line and been removed.

One of the strongest tests which a relay can have is to test its pull-up current just after strong magnetization in the *reverse* direction, and its back-down current just after being pulled up by strong current in the *same* direction. The exact values of pull-up and back-down currents which are allowable must of course be calculated from plant conditions.

Winter Overhauling.

There's one advantage of winter to the exchange maintenance force. When troubles come there are likely to be many of them at once, and some hard to reach, and their repair may represent all the degrees of inconvenience from handling tools in a cold cellar to absolute hazard of life and limb. But in winter there do seem to be more slack days, than in summer, for the average small exchange. These are the times when the wire chief, and the troubleman, and and the lineman have time to gather in the back room and figure out the future of the telephone business. Some men have gone rapidly to the front from the reading and the figuring they have done while waiting for trouble reports to come in. But, as a rule, when the force is putting in its time discussing the big probabilities there are some little realities in sight that would make a careful but nervous manager start a war dance. How about using these slack winter days for fixing up the storeroom? Is all the material arranged in order, so that the man in charge can tell whether he has a complete stock of installation and repair parts and material? Is there enough of each item so that there will not be a sudden discovery of a gap in the line which will delay an important job? How about that lot of old telephones on the top shelf? Brought in because they wouldn't work, and replaced by new ones, so they're no good, of course. Well, what's the matter with them, and how can they be repaired?

What is the manager doing? He may be sitting in the front office and worrying because he can't raise everybody two dollars a week because the earnings were about used up when a reasonable dividend was paid. Of course, if those old telephones were fixed up it would save the company enough to give one man a dollar a week for a year. But what's the use—might as well take it easy because it will be a case of hustle when the next storm comes along!

Sometimes a new manager comes along and stirs things up worse than a sleet storm. Sometimes an inquisitive director pokes around the back room, on an unexpected visit, and starts things. It's just as well to be prepared to show him a few things that are all right when he does come.

Quick Installation Starts the Subscriber Right.

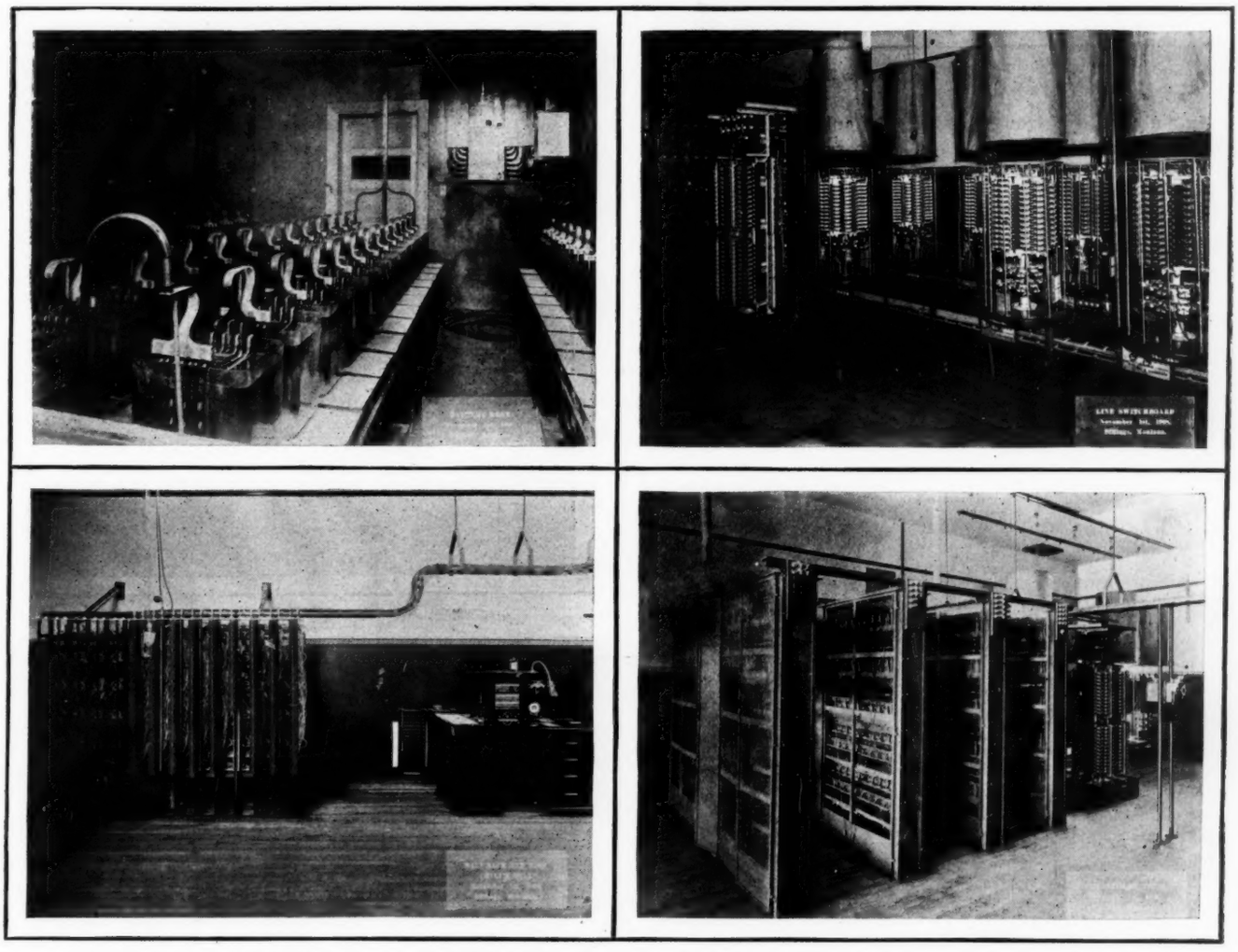
Common experience is that it takes a long time to make a man sign a contract, but once he puts his name down he wants service on the jump. And a woman—she wants the telephone put in that very day, so she can call up her friends and tell them about it. When a company is soliciting business it is a good plan never to send a man to sign a subscriber unless there is a way to get a lineman out to run the loop within twenty-four hours. And while he is busy out of doors, the instrument should be set up ready for connection before the new customer's ardor is cooled. This is the first chance to show that the company means to give good service, and the best opportunity to make a favorable impression that arises in the history of an installation.

With small organizations this happy condition is hard to attain, and as companies grow it is not infrequently true that no definite provision is made for it in the routine. Success depends largely upon the method of handling work orders, and in some companies the clerical system for this branch of routine has been developed to a high degree of perfection. By using forms made out partially in duplicate, so devised as to reduce clerical labor to a minimum, the installation department may be given all the information required for starting work on the new station within an hour or two of the time the order is taken.

The New Exchange at Billings, Montana

By W. T. Powell

The busy little city of Billings, Mont., with a population of 16,000 has one of the most progressive Independent telephone companies to be found anywhere in the country. The growth of the Billings Mutual Telephone Company has been extremely rapid and it now occupies a strong position as a leader in the local telephone business. The measure of public approval and of satisfaction with its service may be gaged readily enough when it is learned that, on the installation of its new equipment, which has just gone into service, a 40 per cent raise of rates was put in force, and that the company now is operating nearly 1,100 telephones, while its competitor has only 300 instruments connected to its lines.



Interior Views in the Billings Exchange Showing Battery Room, Line Switchboard, Main Rack and Wire Chief's Desk, and the Trunking Sections.

The new central office of the company is housed in its own new fire proof building, located in the center of the business district. The structure is of a modern type and its appearance puts it in the upper rank of the business buildings of the city. The lay-out of this building is in accordance with the best accepted standards of modern telephone practice. The first floor is occupied by the general offices in the front, while at the rear are located the toll board, automatic switchboard, terminal rack, power board, charging machines and the wire chief's desk. In the basement are placed the storage battery room and a store room for construction and other material.

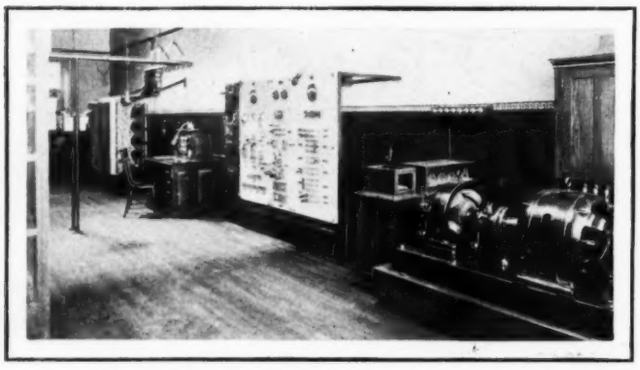
The automatic switchboard consists of 500 individual Keith type line-switches and 300 four-party line-switches, besides the necessary trunking selectors and connectors. The ultimate capacity for which this equipment is arranged is 10,000 lines.

The switchboard, installed under the direction of Mr. A. F. Bennett, of the Automatic Electric Company, was cut over on the morning of Oct. 15, last. The operation consisted simply of pulling tooth picks out of the rack in the new office and cutting off the jumper wires at the rack in the old building, there being no interruption of the service.

The installation of the equipment conforms to the present practice for this type of exchange. The cables, on entering the switchboard room are fanned out and connected to 25 pair blocks on the distributing rack. From these the lines are connected to protectors of the Cook No. 10 type, by Simplex flame-proof jumper wire. The protector has the usual carbon arrester and also has a graphite "heat coil" in each side of the line. This "heat coil" cannot become short circuited or open and can be replaced and resoldered with the special resoldering plug, which automatically tests each coil.

A cable runs from each group of 100 pairs of protectors to a 100-line switchboard, one pair of wires being assigned to each line switch.

The five individual line-switch boards of the installation

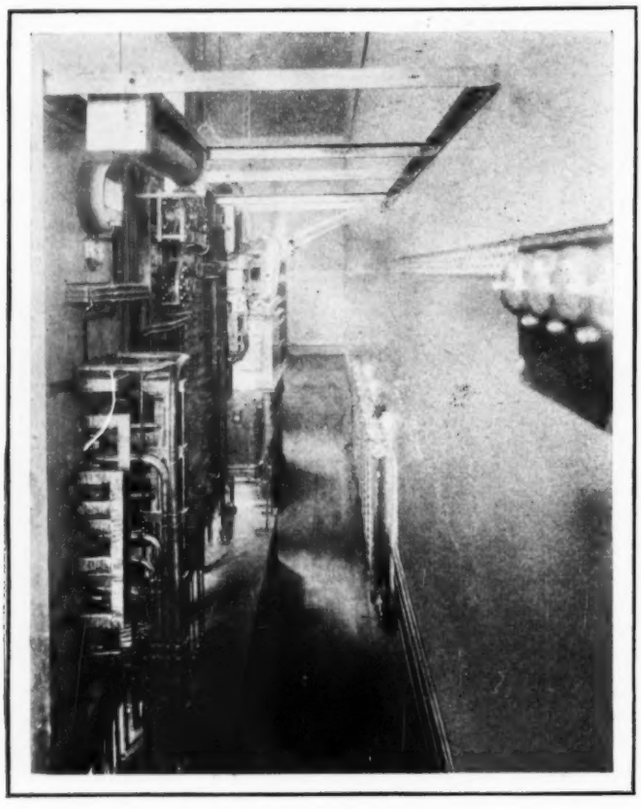


Terminal, Testing and Power Equipment.

contain numbers from 1000 to 1499 and the two-party line boards in the 2000 section are numbered from 2100 to 2499 and from 2500 to 2899 and the one in the 3000 section is numbered from 3100 to 3499.

Each individual board of 100 line-switches is operated by one master switch and has corresponding selectors and connectors as follows: 10 first selectors, 10 second selectors and 10 connectors.

Each party line is operated by two master switches, one for each 50 lines and has corresponding selectors and connectors as follows: 7 first selectors for each 50 lines; 7



Rear of Power Board.

second selectors for each 50 lines, and 20 connectors for each 100 lines, arranged in four groups of 5 connectors each, one group for each party line. The second selectors and connectors, of course, can be used by any line in the exchange.

In making a call a subscriber first takes off the receiver and in pulling the dial to the first digit of the number desired, sends a so-called preliminary rotary impulse, by grounding the battery over one side of the line. This impulse closes a 46-volt battery circuit through a trip magnet on his line-switch in the central office. The operation of the trip magnet allows a plunger to connect his line with whatever first selector the master switch for the board is standing opposite. The plunger, in operating, also makes the first line busy to any incoming call, and sends the master switch to the next first selector that is idle. The dial, in rotating back, sends a series of vertical impulses corresponding to the number pulled over the other side of the line and these impulses cause the first selector shaft to be stepped up to the level of the bank called. The following "rotary" impulse,

The Billings Toll Board.

due to the operation of the dial for the second digit of the number desired, will rotate the shaft, carry "wipers" or brushes to the first idle trunk connecting with the section which is called. The pulling of the first figure of the called number on the dial picks out the thousand and the second the hundred, the third the ten, and the fourth the unit of the number desired. The pulling of the second digit of the number operates the second selector picked out, the same as before, which will trunk the line to a connector in the hundred desired, and the third and fourth, of course, will operate the connector up and around to the line wanted in the desired hundred. For example, if the last two numbers in the called number were 96, the connector switch would step up to the ninth level and rotate in to the sixth contact, which would connect with the called party's line, if it were not busy. If it should happen to be in use, the busy signal would be automatically sent back over the calling party's line.

An interesting feature of this switchboard is the traffic trunk arrangement, which enables a party to have his calls go to the information operator, in case he is out of town.

This trunk also has the "outs" and "change of numbers" connected on it and a party in calling a number that is "out" or "changed", will be told of the condition existing by the operator.

The party lines are rung by a four-frequency harmonic converter, running at 16, 33 and 50 and 66 cycles, and oper-

ated from the storage battery. There is installed a duplicate set, one running one day and the other the next. Connected across each frequency is an alternating current relay which is energized as long as the machine is running but closes an alarm circuit and rings a bell in case the vibrator stops. There is also an alarm circuit for each switch, which notifies the switchboard attendant of grounds, etc. The power

Mr. P. B. Moss, President.

plant comprises a three-panel power board of pink Tennessee marble, fitted with Crouse-Hinds switches, for starting and regulating the charging and ringing machines and for controlling the batteries ; end cell switches which allow of cutting in an extra cell at any time; individual cell test jacks which make it possible to read the voltage of each cell individually, in either battery; and I-T-E "Reversite" circuit breaker, and a Weston Voltmeter and ammeter; two sets of "Chloride Accumulator", 25 cells each, Type E, 7 plates, 120 ampere-hour elements, installed in glass jars of 240 ampere-hour capacity; two charging outfits, one a Holtzer-Cabot motor-generator set operating from the 110 volt 60 cycle city circuit and delivering 30 amperes at 65 volts; the other a General Electric Company's mercury arc rectifier outfit which gives 30 amperes at 65 volts and operates from the 220 volt commercial power circuit.

There is also installed an individual cell charging outfit which makes it possible to charge any one cell in battery No. 1 while charging the No. 2 set, or vice versa.

The wire chief's equipment is a combination, one position

Independent Telephone Company Building in Billings, Mont.

wire chief's and trouble clerk's desk with the necessary apparatus for making tests, including a Weston standard portable voltmeter.

The toll-board is a four position, combination toll, farm and information board, equipped with the usual jacks, drops, trunks, calling devices, etc.

The people of Billings are very much pleased with the new system and it is expected that the increase in the list of subscribers will continue at the same rapid rate. The officials of the company take great pride in the exchange and intend to keep the service up to the highest possible efficiency.

Some of the Employees of the Billings Mutual Telephone Company, Billings, Mont.

International Association Secretary's Report*

For deliberate misrepresentation upon any subject to the general public, there has never been any instance in the United States to equal the publicity and duplicity of the American Telephone and Telegraph Company and its accessories, its licensees, during the past six months. The August article in the Boston News Bureau entitled the "Collapse of the Independent Movement," and the publication over the American Telephone and Telegraph Company's name, listing 114 Independent companies as failures, etc., were both particularly false, malicious and misleading. The Association issued a postal card as follows:

THE AMERICAN TELEPHONE & TELEGRAPH COMPANY
(BELL)

gives a **remarkable endorsement** to the **success and prosperity** of the

INDEPENDENT TELEPHONE COMPANIES

by publishing the names of such as have failed, re-organized, **or passed any dividends** during the **last five and one-half years.**

THE LIST SHOWED 114 SUCH COMPANIES.

A book published, June 1908, contains the names and capitalization of **12,045 NON-BELL OR INDEPENDENT TELEPHONE COMPANIES.**

What other representative business can show but 1% of failures, or **temporary suspension of dividends** during a period of five years?

INTERNATIONAL INDEPENDENT TELEPHONE ASS'N.

September 24, 1908 **Chicago, Illinois**

These cards were mailed to the officers and directors in every Bell company in the United States, that, perchance, one in just wrath and indignation might arise, and insist that further unbusinesslike, and un-American methods heretofore practiced by the American Telephone and Telegraph Company and its licensees, including the Western Electric, must cease.

The postals were likewise mailed to bank officials in New England; and to those in several of the large cities where we learned the Bell pamphlet was circulated, including New York City. In the latter city, the secretary of this Association arrived the day when the Bell pamphlets were being distributed. He was fortunate in having an interview given out over the stock ticker service in Boston, New York, Philadelphia, Baltimore, Buffalo, Cleveland, Chicago and other cities, which was copied by financial journals in Wall street, New York, and Milk street, Boston, and in leading newspapers in various cities.

During the year copies of Mr. G. R. Johnston's splendid article, being "Some Comments on the 1907 Annual Report of the American Telephone and Telegraph Company" have been distributed, but not as many operating companies as we had expected have given local distribution to this article, which the writer of this report considers to be sound in argument and conclusions. Thus far no one has had the temerity to even criticise Mr. Johnston's logic or deductions. The Association's publications of documents, and of such which it will doubtless publish from among those presented at this convention, can, undoubtedly with marked advantage, be used for general or selected distribution among newspapers and journals, bankers and brokers, business men and professionals, stockholders and employees, by local telephone companies. This is proper and successful publicity.

It is a pleasure to note that the court decisions in the Ohio cases (Delphos and the Middlepoint), and in the suits already referred to at Dubuque and Toledo, have received extensive publicity in the leading cities of our country, and by your co-operation many more papers will undoubtedly aid in getting before other communities the facts relating to these suits, and as to other matters of vital importance pertaining to the Independent telephone interests.

Not only is it extremely desirable that Independent telephone men shall be informed upon these important matters, but it is far more important that the public generally shall likewise be well posted on telephone matters and thus know what are the motives behind the vicious campaign of paid publicity being waged by the American Telephone and Telegraph Company (Bell), throught the popular magazines, financial journals and leading newspapers, as by their special publications.

EXPRESS CONTROVERSY.

For several weeks during the summer, but principally in June, from different states letters were received by this Association from Independent operating companies, stating that the American Express Company had ordered out the Independent telephones, unless the service was furnished without cost to the Express company, and that if left in service, six months' notice should be given before its removal.

An effort was made to learn whether any Bell telephones had been removed, by addressing the officers of the State Associations, but for some time no such case was found. A statement of the facts and conditions, as then known at the Association's offices, was issued, and particularly called attention to the apparent discrimination by the American Express Company against the Independent telephone companies.

Soon thereafter a conference was held with Mr. L. W. Fargo, vice-president and general manager of said company, in Chicago.

Mr. Fargo stated that the May order made no reference to either Independent or Bell companies; that no discrimination was intended against the Independents; that none of the officers or directors of the American Express Company were directly interested in any Bell company.

His attention was called to several cities, having more Independent telephones than Bell, and where the latter was retained and the Independent telephones ordered out. He made assurances that every case where telephones had been removed would be investigated and if any mistake had been made the same would be investigated, and if any mistake had been made the same would be corrected. He also agreed to have investigated all cases to which his attention might be called by the Association. He stated that a number of Bell telephones had been removed, but refused to furnish a list of telephones taken out, either Independent or Bell, or a copy of the original order.

Quite a number of cases were later placed before Mr. Fargo, by the Secretary, and in a few instances the Independent telephones were re-instated. In the large majority, however, no action was taken, as far as learned, and for some weeks nothing had been done to remove our contention or change our opinion that the American Express Company has discriminated against the Independent telephone companies.

The writer believes that the public are justified in demanding that telephones be taken by public service corporations, and that we have a right to insist that such telephones be paid for at regular rates; that, if the American Express Company, or any other company, continues the policy of discrimination against the use of our tele-

*Abstract of the report for 1908, of Secretary Jos. B. Ware, read at the convention of the International Independent Telephone Association, Chicago, December 2, 1908. Concluded from issue of January 9, 1908.

phones, or with the demand of free service, the members of the various telephone associations, and the public, should be informed of the facts, in order that all interested, financially or otherwise, in the telephone companies may thus be able to give their patronage, if they so desire, only to companies believed to be doing business on equitable and proper business principles.

OHIO, INDIANA AND ILLINOIS.

In view of the gratifying results up to this time, in connection with the recent suits involving matters of general interests to all telephone companies, it may not be amiss to briefly consider the conditions as to Independent and Bell strength in the States of Ohio, Indiana and Iowa—the three States in which the Bell efforts to secure mergers or toll connections, have, during the past two years, been most active, insistent, reckless and lawless.

In Ohio some fourteen (14) or more companies, organized and operated for years, as Independent, entered into relations with the Central Union, at its frequent solicitations, even importunings.

These companies had entered into long term contracts with the United States Telephone Company for exclusive toll line privileges, and it was these, with the Richmond and Butler, Indiana, companies, which were ordered by Judge Tayler, U. S. District, Toledo, Ohio, on November 21, to disconnect the Central Union (Bell) circuits, and issued an injunction restraining said Bell company from continuing the urging or making of such arrangements.

In Indiana a similar record could be made up of companies connecting, under different arrangements and conditions, with said Bell company during the past two or three years.

The Central Union Telephone Company (Bell) occupies as its territory the states of Ohio, Indiana and Illinois, with the principal exceptions of Cleveland, Cincinnati, Ohio, Evansville, Indiana and Chicago, Illinois.

In this territory on January 1, 1908, as shown by President Richardson's annual report for the Central Union (Bell) Company ending December 31, 1907, that company had 185,935 Bell telephones in service. As shown by the July issue of the official organ of that company, the Central Union News, upon July 1, 1908, that company had 188,711 telephones in service. In identically the same territory the Independents had, approximately as follows, on July 1, 1908:

Ohio	295,000	
Indiana	205,000	
Illinois	120,000	
	620,00	
Bell	189,000	—per above report.

Mr. Whitney, a superintendent of the company, admitted, in a certain report, that in Indiana the Central Union had but 15 per cent and the Independents 85 per cent of telephones in use in August, 1907.

As indicating further the situation in Indiana, it is of value to know, that outside of Indianapolis, where both interests are numerically about on a par, and in Evansville, where another Bell licensee has control without competition, the following table comprises the other larger cities in the state, and gives a fair indication of present conditions, relatively, between Bell and Independents on November 1, 1908:

	Independent	Bell
Terre Haute	4,036	1,900
LaFayette	3,467	360
Fort Wayne	4,900	300
Crawfordsville	1,538	650
Logansport	2,636	1
Peru	1,700	700
Connersville	1,215	0
Richmond	2,457	42
	21,949	3,973

These figures indicate what would be the service conditions, telephonically, in Indiana if every Independence company were rigidly Independent, or the Bell company compelled to obey the laws.

During the past year, while the Independent growth has continued in Indiana, the Bell company has been losing ground in nearly all its exchanges, so that there is little incentive or reason for an alliance with the Bell in that State, where the Independents out number the Bell on about a five to one basis.

As explaining in part the conditions in Iowa, it may be said that the same motives exist, as in Ohio and Indiana, for the Bell to secure Independent connections and alliances, being the enormously larger number of Independent telephones in service as compared with the Bell number. It is only necessary to state that there are over 200,000 Independent subscribers in Iowa and less than 50,000 Bell.

Judging from the Marshalltown record the Iowa Independents have a way peculiarly their own, and very effective, in neutralizing mergers and alliances with the common enemy, by promptly arranging to occupy the field with a modern built plant.

But why should any Independent companies make alliance with Bell companies under the conditions outlined? Those who permit Bell emissaries, agents or officials to time and again argue or re-argue the merits of a "unified service", the "elimination of economic waste," and the advantages to the local company in the elimination of competition, are misled into believing, or at least into half believing the arguments, and in several instances as referred to, have surrendered both legal and moral principle for the price offered.

It is the writer's judgment that competition or the possibilities of competition is inevitable in the telephone business, and for the best interests of the public, of which we are a part.

No form of competition is as valuable to us, as a foreign owned, royalty burdened kind, with old plants, or re-constructed ones. In other words, to protect our companies from local owned competitive exchanges, we should encourage Bell competition to continue, as it is from necessity upon commercial, rather than co-operative lines. We have no reason to fear the Bell as a competitor, but rather our own kind.

ENGINEERS AND EXPERTS.

Apparently, many of the smaller companies do not appreciate the value of having a practical engineer lay out new work, or make plans for re-construction.

There are experienced, honest and capable consulting engineers who can be temporarily secured at reasonable cost by companies not being able to afford a regular engineering expert in their employ. Such can often immediately save the company money, and the future saving, by reason of proper planning for it, is beyond comprehension of those who have not looked into the matter.

Reference is made to this subject wholly in the interest of the operating companies, whose association this is.

STATISTICS.

As Independents we have, perhaps, more to regret by reason of failure to obtain accurate and comparatively complete telephone statistics of our several States, than in any other one thing.

While other State Associations are making progress in this matter, Ohio, Indiana and Iowa have accomplished most.

Many local companies have been too busy caring for the unsolicited orders constantly seeking their offices, to give proper attention to statistics. Of the more than 7,000,000 telephones in service in the United States, the Independents

have over four million and the Bell approximately three million.

It is hoped that the Independent companies have co-operated with the government in its efforts to secure complete telephone statistics, thus officially verifying accepted facts.

THE FUTURE.

The International Association should be ever ready and prepared to defend our common interests against all attacks, whether in open warfare, or by insidious and gum-shoe methods, either within or without.

If our property and our rights are not worth fighting for and protecting, they are not worth having. Only by active protective efforts can we retain what we have secured through past effort, and every one interested or benefited should thus join in the protection of the common interest.

Operating telephone companies should each set aside a certain small per cent of their income to be used for the protection and perpetuation of the business. This would cover publicity, litigation, legislation and the Association's expenses. By such general systematic method the burden would be extremely light and the results would be very greatly increased.

The present outlook is more flattering even than have been our past successes, great as have such been, but through closer union of effort by the many companies will greater results and benefits be secured.

Economical Development of Toll Territory*

By Frank F. Fowle

Preliminary to building a toll plant a thorough inspection of the territory should be made, and an estimate prepared covering the probable present and future development. Such an investigation makes possible the best engineering forecast as to the feasibility of developing the territory, including the capital required, the probable profits, the rates that must be charged, and the kind of service that can be offered. The order in which the various steps should be taken are as follows:

1. An inspection of each local system that will be served, noting the existing development, the rate of growth of population and development, and the preparation of an estimate of the cost of overhauling the plant so that efficient transmission will be obtained.

2. A subdivision of the entire toll territory into rate zones or districts, so that every local telephone is definitely located within the confines of some particular zone.

3. A computation of the traffic to be expected between the two zones of every pair that can be named, based on the present local development and on the expected development at succeeding periods of five, ten, fifteen and twenty years.

4. The choice of locations for toll centers, the choice of the proper operating methods and a computation of the number of circuits necessary to handle the traffic at present and at succeeding periods as last named.

5. Based on a transmission standard which will be adequate when the twenty-year development has been reached, a calculation of the cost of the necessary plant to commence business and the cost of the subsequent additions to the plant from time to time.

6. An estimate of the plant charges and the minute-mile rate necessary to derive an equal revenue.

7. An estimate of the terminal charges, so that by means of formula (1) the complete rate schedule can be worked out.

There will naturally be many possible layouts of pole lines and toll circuits which will supply a given service, but in general that layout is the best one which gives the highest miles of wire per mile of pole line for the whole system. The reason for this has already been made apparent in showing the effect of the miles of wire per mile of pole line upon the charges per mile of circuit per annum, and consequently upon the rates. One of the salient points to be observed in obtaining a high ratio of wire miles to pole miles is illustrated in Fig. 12. *A*, *B* and C are toll centers in a toll system which is not fully shown. In the event that the traffic between *A* and *C* does not require circuits enough to load a pole line economically, the necessary circuits may be erected from *A* to *B* and thence to *C*. When the future time arrives at which the traffic between *A* and *C* warrants a direct pole line, the circuits from *A* to *B* and *B* to *C* may be connected to the toll board at *B*, to form two groups of direct circuits, one from *A* to *B* and one from *B* to *C*. This plan depends for its success upon the future need, as shown by the development study, of at least as many additional circuits between *A* and *B* and between *B* and *C* as were needed for the entire traffic between *A* and *C*. Against the saving in pole line investment there is the increased wire cost due to the extra mileage and the consequent impairment of transmission.

A high ratio of wire miles to pole miles in rural localities of sparse development will be obtained by making the greatest feasible use of existing pole lines, including exchange lines, farmer lines and such toll lines as may be in existence. In some cases a toll development may be possible only through the economies effected in this manner, making every use of existing poles and building only enough new pole line to span the gaps where no poles existed hitherto. There may be instances where it will pay to rebuild old lines, which have depreciated nearly 100 per cent, making the new line of adequate strength to sustain the extra toll circuits.

The spare capacity of a pole line at the time it is erected depends naturally upon the expected rate of development. In the rare cases where no future development is expected, the full loading of a pole line when it is erected can be justified, but otherwise not. In no case, however, should the line be adequate to care for the future development at a period beyond the average life of the pole line; this statement is called forth by the fact that there are instances where this has not been observed, such, for example, as the erection of a 35-ft. line adequate for 40 wires with an initial load of 6 wires. Every foot of unnecessary height in a pole line is a waste of capital and therefore an extravagance. It ought to go without saying that the spare capacity of a pole line should be adequate only to care for the development within the life of the line; equally the line should be no higher than the conditions require.

The following example is given in illustration of the method of computing the minute-mile rate. On the 25-ft., 10-wire line, the annual charges per circuit mile on an air-line basis were computed to be $37.75. Under a rate system, uniform throughout the hours of the day, the ratio of

*Paper presented at the Convention of the International Independent Telephone Association, December 2, 1908. Concluded from issue of January 9, 1909.

the average week day (Monday to Friday) traffic to the total traffic for a month is .0376. Consequently each circuit-mile must earn $3.146 per month or $.1183 per week day. Taking average circuit loads of 20 messages per day, each of 4½ minutes duration, the minute-mile rate is determined to be $.00131. The rate for a 3-minute conversation on a haul of 100 miles, allowing $.25 to cover terminal charges, would be $.65 plus $.15 for each additional minute. The rate on a 200-mile haul would be $1.05 plus $.25 for each additional minute.

A large degree of economy in a moderately developed toll system is possible by the use of phantom circuits and the average annual charges per circuit-mile on a 20-wire line can be decreased about 25 per cent if full use can be made of four phantom circuits. It is difficult in small systems to make efficient use of phantoms because of the difficulties encountered in ringing through several sets of phantom coils. The two physical circuits composing a phantom are unsuited for way toll circuits with bridged or looping sta-

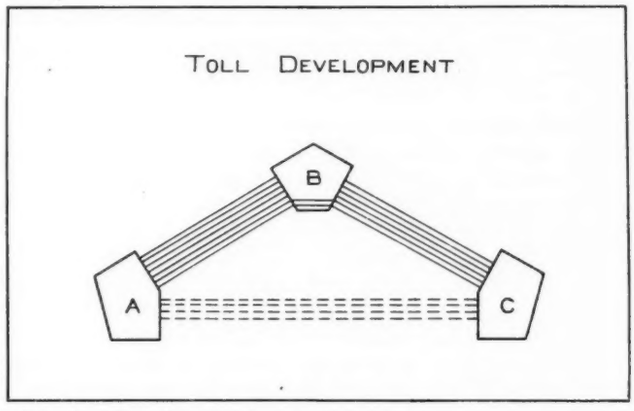


Fig. 12.—Plan for a High Ratio of Wire Miles to Pole Miles.

tions. The most efficient use of phantoms is possible when at least three direct circuits are required between a pair of offices, two of which are physicals and compose a phantom for the third. The addition of phantom coils to a physical circuit somewhat impairs its transmission efficiency, and due account must always be taken of this fact in considering the advantages of phantoms; the transmission over the phantom is slightly better than over the physicals. The physicals composing a phantom should be identical circuits as to gage and kind of wire and pin separation; they should be adjacent circuits on the same cross-arm.

There is no choice between copper and iron for long haul circuits, copper is imperative. But as regards short haul circuits, there is something more to be said. There is no great difference in annual charges, but a considerable difference in first costs, iron being the cheaper. The annual charges are not greatly different for the reason that the low depreciation and high capital charges on copper are about equal to the low capital charges and high depreciation on iron. Consequently a given amount of short haul service can be furnished with iron wire for a smaller investment than it could be furnished with copper. The risk to capital from possible failure of the enterprise may therefore be regarded as least when iron wire is used. On the other hand it should not be overlooked that the low depreciation on copper is due not only to long life, but to high junk value. There have been instances of the purchase of copper wire and its use for a number of years, after which it would have been possible to take it down and sell it at a net profit. This has been possible because of the purchase at prices below the normal market with subsequent rise to normal, or the purchase at normal with subsequent rise to abnormal prices. The great electrical development of the country is almost certain to make junk copper wire a valuable asset for many years to come, or possibly for an indefinite period. This discounts to some extent the apparent reduction of capital risk by the use of iron.

FUTURE DEVELOPMENT.

The cost of erecting the physical plant necessary to offer a stated amount of toll service has been shown to depend fundamentally upon the three following quantities:

1. The standard of transmission.
2. The circuit loads.
3. The miles of wire per mile of pole line.

As the system develops there will be necessarily some decrease in the transmission efficiency, but there should be an increase both in the circuit loads and the miles of wire per mile of pole line. Co-ordinately there should be a reduction in the rates and some improvement in the speed of service. The circuit loads and the speed of service bear to each other an inverse ratio and consequently an attempt to improve the service unduly will result in a decrease of the circuit loads; reference to Fig. 8 will make this clear. It is reasonable to give the public better service as the business enlarges, but the improvement should not wholly cancel the increase in circuit loads which otherwise would result, unless the public demands faster service in preference to a reduction of rates. It can hardly be over-emphasized that the faster the service the higher must be the rates, for a fixed percentage of net profit, and this principle should be given a large amount of publicity because it is not believed to be generally understood by the public.

The development study should be revised and extended every few years, so that the forecast for the immediate future may be as accurate always as possible. Many improvements in the plant will be possible as the business develops, such as the shortening of original routes, the substitution of copper wire for iron, and the development of new routes paralleling old ones for the purpose of reducing the liability of service interruptions from the failure of any one route. There may, from time to time, be improvements in the art of which advantage should be taken. Such improvements do not always make their appearance at a time when they can replace plant which has depreciated 100 per cent. The saving which such improvements effect must more than offset the undepreciated value of the discarded plant if the adoption of the improvements suggested above is justified.

The trend which the development of the business should take has already been indicated, but a knowledge of the variation in the following quantities from month to month and year to year is necessary to determine the actual course the development is taking and to discover the general cause for any wrong tendency.

1. The total investment per mile of pole line.
2. The total investment per mile of wire.
3. The miles of wire per mile of pole line.
4. The average revenue per message.
5. The average haul.
6. The average duration of conversation.
7. The average receipts per minute-mile.
8. The average circuit load per day.
9. The average speed of service.
10. The average terminal charges per message.
11. The average receipts per wire mile per annum from message service.
12. The average receipts per wire mile per annum from private line and leased wire service.
13. The ration of total operating expenses to total revenue.
14. The ratio of total annual revenue to the average total investment during the year.

This list appears at first sight rather formidable, but in reality it depends only upon the most fundamental statistics of the business, without a knowledge of which there can hardly be an intelligent understanding of the changes that

are taking place constantly and must be tending in the main toward either increased or reduced profits.

COMPETITIVE TERRITORY.

The subject has been treated hitherto entirely on a non-competitive basis, so far as competition affects the predetermination of traffic. Competition in public service is a much-discussed and unsettled subject, so far as telephone service is concerned. The writer holds the view that competition is justifiable in every case that a public necessity for it can be shown. Upon this view the argument would hinge upon what constitutes a public necessity. The fault of many public service companies which were early engaged in the telephone business lay in their failure to develop, their failure to recognize that a high-priced exclusive service, only within reach of the means of the few, was not public service.

It is offered as fundamental that the measure of efficiency in public service in any given district is the ratio of the number of the public service company's patrons to the total population. Among the foremost obligations of a public service company is that of developing its territory to the greatest possible extent. This implies that good transmission, accurate service and fast service must be given at the lowest rates consistent with the principle of cost plus a fair profit on the investment. In toll service the situation as regards competition is not identical with the case of local service, and the discussion which follows is intended to apply to the former entirely.

Poor service in any one of several forms, high rates and underdevelopment are the basis of a just demand for competition. The investor is concerned first with whether the demand can be supplied on a profitable basis. There are, from the standpoint of safe investment, far greater risks in competitive than in non-competitive territory, due to the possibility of rate wars and profit cutting. There is a very slim margin to meet such contingencies in a business that is operated upon the principle of cost plus a fair return on the investment. Every unprofitable investment hurts the business as a whole, because it usually receives much more prominent notice than the many successful investments, and consequently disturbs the confidence of the investor.

The point upon which the writer would place special emphasis is the necessity of applying the whole development study, which is the subject of the paper, to competitive territory with even greater care and thoroughness than would be used with non-competitive territory. Two toll systems side by side, serving the same territory under like conditions, whether they connect with the same or competing local systems, cannot furnish service of the quality and at the rates possible with a single system until one of the two systems secures nearly all of the business, or there is so much business that both systems may approach a large development. The duplication of pole lines everywhere throughout a territory means necessarily a smaller number of miles of wire per mile of pole line than in the case of one system furnishing the same amount of service.

On the other hand the public will enjoy whatever improvement in service and rates the new competitor is able to offer, and to that extent the conditions previously existing will have been improved, although the ideal service may not be closely approached. In the event that the old company is awakened to a sense of its public obligations when at last its business is threatened or perhaps reduced to an embarassing extent, it may improve its service and reduce its rates sufficiently to win back some of the business transferred to the new competitor, and leave the latter in the position of having performed a valuable public service without deriving the expected profit. To the end that this may not happen, it will be a matter of business prudence to secure, in advance, long-term contracts of such a nature that the plant with which business is commenced shall have continuously a traffic load that will make the investment profitable. Any other course necessarily casts the whole venture into the speculative class, owing to the uncertainty as to the future course of the old company, except when that company is financially unable to make improvements. It has not been the purpose here to attempt a definite treatment of the question of competition vs. monopoly,—that is believed to be properly regulated by the matter of necessity,—but to point out the conditions which make competition desirable and some of the results which competition may bring about.

Expert Report on Method of Accounting for Chicago Telephone Company Filed with City.

A comprehensive and important report has just been made to Commissioner Hanberg and Comptroller Wilson of the city of Chicago by the engineering firm of D. C. & Wm. B. Jackson and Arthur Young & Company, the city's consulting accountants. The methods outlined are according to the telephone ordinance, and will give the city as full information about the telephone rate situation as it now gets of the traction situation.

The report gives a detailed statement of the results and conclusions reached after extended study of the question of adequate record keeping and accounting to be adopted by the Chicago Telephone Company to carry out the intentions of the telephone ordinance in the matter of regulation of rates. The ordinance reserves to the City Council comprehensive powers in the adjustment, changing and regulation of telephone rates after thirty months from the company's acceptance of the ordinance, which was December 1, 1907, and thereafter at intervals of five years; and it requires the company on notice from the city comptroller, to produce "all the facts, data, and information in its possession which the city may require to assist the city to make a proper and reasonable regulation of rates."

For the purpose of an intelligent exercise of the right to regulate rates at the end of thirty months it is important that the information produced for the city shall particularly exhibit: (1) the investment required for furnishing each class of telephone service, (2) the cost of furnishing each class of service rendered, and (3) the revenue derived from each class for service rendered.

The ordinance clothes the city comptroller with authority to prescribe the form and manner of keeping accounts and records by the company, and the report is in conformity with this authority. The object of the report is to formulate a system of keeping records and accounts to be adopted by the telephone company so that all the facts, data and information necessary to make proper and reasonable regulation of rates may be furnished to the city.

A more comprehensive system of record keeping and accounting than has heretofore been introduced by any telephone company is required to make apportionment of costs among the many different classes of service established by the ordinance, and this report is in a sense without the guide of precedent. To accomplish the purpose, the costs of giving service must be separated and properly apportioned among the different classes of service. Leading executive officials of telephone companies have insisted that the accomplishment of this result is not feasible. The object of the work was therefore unique, and the difficulties large. The record keeping and accounting will, of necessity, be carried on by the company's men directed by the company's officers, and the most successful results can only be accomplished if the company's officers are willingly in co-operation with the city in the matter. Fortunately, the company co-operated in the work of drawing up the forms for the accounts, and its officers have given much attention to the problem in hand.

The rate schedule of the ordinance requires the company to maintain a comprehensive service suited to all classes of users, which analyses into fifteen classes of service for Chicago Exchange users, seven classes of service for neighboorhood exchange users, and two special classes embracing private lines and mileage extension lines. These are enumerated in detail in the report. They are all for service within the city. Toll service to points outside of the city is additional thereto. The difficulty of the work of formulating the accounting is increased by the number and variety of the classes of service, but these classes seem to be all necessary to give the great range of service needed in the city.

The telephone company's existing accounts divide the investment in plant and property under three general headings. They are further divided under fifteen sub-heads. Some of these sub-divisions have been made, however, for only one year. To give these the scope desired, it is needful for the company to separate its investment in property outside the city from the investment in property within the city. This is required by the terms of the ordinance. Also, for the purpose of obtaining the information needed for use when the city regulates the rates, the company must separate from the remainder of the investment within the city all of that solely relating to toll service, and it must separate the investment in plant and property utilized to serve neighborhood rate subscribers from the investment in plant and property utilized to serve Chicago rate subscribers. The latter must be subdivided so as to ascertain the investment on account of trunk circuits leading between the telephone offices and the investment on account of the subscriber's primary traffic. The subscriber's circuits must be divided between circuits on poles and in underground conduits, and the circuits provided in large buildings for distributing the telephone lines therein. The equipment must also be divided between that part which is required before service can be furnished to subscribers and the part which must be increased as the number of messages per subscriber increase.

The most accurate method of arriving at the desired separations and divisions would be by making a full inventory and appraisal of the property of the telephone company within the city limits; but it seems to be necessary to proceed for the present on the basis of estimates which may be founded on quantities and costs standing on the company's records, because an inventory and appraisal would require a number of months for its satisfactory execution. The study of the conditions of the records of the company, which are set forth in the report, has led to the conclusion that the needed sub-division can be accomplished with reasonable approximation through a process of engineering estimates based on those records.

The city probably will eventually desire to have a complete inventory and appraisal of the physical property of the telephone company. However, the plan of accounting laid out in the report expects that suitable sub-divisions of the plant may be reached through accepting the divisions found in the telephone company's accounts, and deriving the further sub-divisions by mathematical processes and engineering estimates. This will serve all the needs of the present, and a complete inventory can be ordered when the city finds that it would be desirable.

The investment and operating cost for telephone service may be divided into two principal parts: (1) a part which may be assumed to be independent of the amount of use of the telephones and is fixed for any class of service in substantial accordance with the apparatus required to give the type of service for that class; and (2) the remaining part dependent almost directly on the amount of use of the telephones, that is, on the extent of the telephone traffic. Illustrative examples indicating the necessity of this sub-division are given in the report. The phrase "Readiness to Serve" is adopted in the report to indicate the first part, and the phrase "Service Rendered" to indicate the second part. The setting apart of these two parts of plant from each other is difficult because of the lack of adequate means for keeping separate records of messages belonging to each class of service. The company maintains a count of the messages from all of those subscribers whose bills are based on messages, and it therefore keeps data from which a record may be made of the messages originated by each coin box class of service and by each of the regular measured rate classes (omitting the commuted rate lines). It also makes a monthly count (called a "peg count") of all calls for one day in the month, but this gives no information as to the relative number of messages originated by the various flat rate classes of service or the commuted lines.

The importance of obtaining a true record of the messages originated in each of the latter classes of service will be understood when it is known that much the greater part of the traffic handled by the company's central office comes from the flat rate and commuted rate lines. The results of a recent peg count taken at central offices serving the business part of the city show that 17,011 lines in these classes originated no less than 632,796 calls during twenty-four hours, while the 36,668 measured rate lines of the same central offices originated only 400,356 calls during the same twenty-four hours. Similar results are exhibited by the records of all the monthly peg counts.

As already indicated, a large part of the cost of giving service is proportional to the amount of the traffic, and it is an essential feature of the plan presented in the report that the records of traffic shall be complete. The great disparity in the traffic of the different classes must make a large difference in the cost of service, and the conditions relating to the cost in the different classes cannot be adequately known until arrangements have been devised for keeping classified records of the messages orginated by the flat rate and commuted rate subscribers as well as the others. The most satisfactory way of doing this is by putting a message register or meter on every flat rate and commuted rate line; but, owing to the fact that message registers are not yet installed, the company should organize a special force of clerks for counting and supervising the counting of these messages until registers are installed. The report points out that the company is now taking steps to organize such a force.

It is obvious that over 170,000 telephones cannot be considered individually, one by one, on account of the insuperable difficulty and cost of keeping records, but that they must be considered in groups of similar character. These groups are fixed by the schedule of rates imposed on the company by the ordinance. The service to most economically meet each subscriber's needs can be obtained by him from some one of the classes of service of the rate schedule, and subscribers of reasonably similar requirements are therefore attracted together in groups corresponding to the rate classes. The rates are so numerous and carefully adjusted that every user can get telephone service adapted to his needs. It is therefore convenient and proper to adapt the accounting methods so as to arrive at the average cost of service for each of these classes. In pursuance of this object the report shows a plan for apportioning the company's investment among the same classes, and segregating the revenue according to the classes.

The report goes into all the complex problems of telephone accounting very completely, and it is expected that the city comptroller will require the Chicago Telephone Company to adopt the methods described in order that the city council may become fully informed about the cost of telephone service and the affairs of the telephone company.

Fire in Temporary Paris Telephone Office.

Dispatches from Paris state that in spite of the secrecy of telephone officials, it has leaked out that the temporary exchange in Paris, to replace the one burned not long ago, has been afire. The cause is reported as a short circuit in the equipment. The flames were extinguished before serious damage was done.

Economy in Collecting and Accounting*

By J. M. Rider

Were I to outline a scheme of perfection in the question before us, it would comprehend an automatic register into which the patron could deposit his coin, and have the assurance that it would be properly credited, and that no one at the other end of the line would dispute with him as to the amount deposited or the accuracy of his indebtedness.

I would have each subscriber early on the first day of each month call at the office and deposit in the machine the exact amount of his tolls for the month just closed, and on the first day of each quarter contribute the amount of money necessary to continue his rental service for the coming period. I would not object to maintaining adequate elevator service if the office was on the second floor, and would furnish easy chairs for patrons to visit with each other while jollying our service and methods and waiting for their turn to join the procession. This, you see, would do away with all bookkeeping and make every man a free moral agent.

To dispose of the other side of the ledger, and be incontrovertibly impartial, I would have each one of our creditors, on the last day of each month, come to the other side of this automaton and select from our heap of coin, the exact amount due him. I do not imagine that the ordinary inducements in the way of chromos, bouquets or free lunch would be necessary to encourage the procession on this side of the labor saving device. We are so much used to chasing after those who owe us that the knowledge of date on which payment will be made and the place where we can get the cash is all we want as an inducement to action.

Economy in collecting is to get all that is owed us at the lowest outlay and with the least labor. This will be more nearly realized by the dress and address of those whose duty it is to form the connecting link between the patron and the patronized. He must have a consciousness that his claim is just and that he is entitled to receive what is due him at the time the demand is made. I find that a degree of independence is a necessary adjunct in a good collector; an independence that will impress the debtor that it is a purely business transaction, that we have delivered the goods, or have bound ourselves to do so, and his part must be as promptly met. I would not have him insolent in his words or imperious in his manner, as he will surely fail if he is not gentlemanly in his deportment.

One feature of economy in accounts is to have as little bookkeeping as will suffice to reach the result. I came into the position of cashier of a bank some years ago, after it had been working about twenty years. The old laborious system of bookkeeping had been in use, and with cash book, journal and ledger they kept in minute detail every transaction of every customer in that community, so that he could find out from their record his financial dealings on any day for a generation. At least two tons of costly books had accumulated, which represented the needless labor of several clerks for the period in question. We changed to the modern plan of loose-leaf ledger and tabulated columns, and I think I can carry the books used during the past fifteen years in a common suit case. There is no economy or value in going into a detailed history of each transaction when a couple of figures will show the same result. Why keep the books for your whole constituency when your object is to accurately record transactions affecting your own business only?

What we are after is to find out how much is left in the till after each man contributes his dues and each creditor has been satisfied. We, of course, must have enough figures to show what our business is costing us, both in the unit and in the aggregate.

Much of the anguish of the collector would be eliminated if the shortcomings of the construction and operating departments were removed. If a man has anything at any time to "kick" about, his memory will be most active when he settles his bill, and the discourtesy of operators, the freaks of the storm and failure upon the part of the management to serve the customer as he thinks he should be served retard settlement, and delay or entirely prevent economical adjustment.

I realize that methods which would be proper and good in the larger exchanges would probably be disastrous in the smaller exchanges. In the former it is business prudence to get a contract from each subscriber, stipulating what is expected on the part of each party to the compact. Proper penalties are imposed in regard to the nonpayment of accounts, and even the removal of the instrument is necessary in many cases. With the smaller exchange this *dernier ressort* may seem severe and would no doubt be food for neighborhood gossip, but a single case would have a salutary effect on the whole system, and demonstrate the business intentions of the management. A slow paying patron is more expensive to the collection department in the small exchange than in the large one.

If the size of the exchange does not require the entire time of a collector, it will be found profitable, anyhow, to have a prompt, energetic system of settlement. Start out on the first day of the month, in the morning; visit every man owing you; get your pay from each or agree upon a date upon which you can make a second call, and make your second visit, and a third one, if necessary, on the minute agreed upon. The delinquent will soon be impressed with your earnestness and persistence, and will early learn that you will not forget him. Much time will be saved in collecting rural switching fees by inserting a clause in your contract, indicating that payment is to be made in a gross sum by the treasurer of the line. The fee is not generally large enough for individual chasing.

My experience leads me to observe that the prompt payment of our own debts contributes to economical business methods. The reason so many people and companies never seem to be prosperous is because they are everlastingly and irretrievably in debt, generally the result of ignorance as to the aggregate amount of debt. As a good plan for all to adopt, I want to commend the custom of a real estate friend of mine in his effort to know how much he owes. On the first day of the month he collects all his bills of the preceding month, adds the amounts, and makes a check for everything he owes. If his bank account will not stand the strain, he signs a note with the bank in sufficient amount to prevent overdraft. In this way he knows exactly how much he is in debt and to whom he is indebted, and when he is expected to pay. This plan has a cautionary influence over his purchases the coming month, and when he gets any money it is devoted to the liquidation of his indebtedness.

I have already consumed more time in the consideration

*Abstract of a paper presented at the convention of the Northeastern Iowa Independent Telephone Association. Mr. Rider is secretary of the Cedar Rapids & Marion Telephone Company.

of the first half of my subject than was allotted me on this program. As the question of auditing has more to do with the ownership of a plant than its management, I will dismiss this part of my subject, with the remark that I think it prudent in all exchanges and absolutely necessary in the one whose ownership is represented by the stock certificate to have, at frequent periods, a reckoning made by competent talent. The person doing the work should be one having experimental and practical knowledge of the business, that the audit may be not only of books and bookkeeping, but methods and plan of operation, and his report should carry with it recommendations for the improvement of the system.

In this way faults could be corrected and the most improved plans of work be determined. It is economy to secure a good man, even if his price is more than it is worth, considered from the standpoint of time consumed. It gives the stockholders a knowledge to which they are entitled, and, in the transfer of stock, the value is much more stable and authentic.

A Modern Intercommunicating System

By Leigh R. Gillespie

The position occupied by the telephone in the business and industrial world, and even in the household realm, has been one of continually increasing importance, and as the people become more familiar with the various uses to which this time saving instrument may be put, the more indispensable do they find it in their every day lives. The private branch exchange and the intercommunicating system have brought every department of the store or factory in closest touch with the manager's office, and the time saved in conducting inter-departmental business through these efficient

Fig. 1.—Ten-Line Switch and Desk Telephone for Intercommunicating System.

agencies is incalculable. But while the operation of many intercommunicating systems which have been installed are eminently successful, the experiences in other cases have not been so satisfactory.

The circuits of this type of a system are necessarily somewhat complex, and although installed in a first class manner, the system often suffers when placed in the care of an employee with at best a very limited telephone experience. Any fault in the design of the apparatus, which may develop a case of trouble, under these conditions, readily breeds additional cases, and a skilled troubleman must be procured to straighten out the tangle. After experiencing a few such difficulties, it is readily seen how the average manager would look with greater favor upon the less complicated private branch exchange, even for systems of ten lines or less. A second objection to the older type of intercommunicating system has been the cumbersome and unsatisfactory methods of obtaining trunk connections with the local city exchanges. The cost of cabling this type of a system is also prohibitive in case the stations are distributed over a considerable territory. An intercommunicating system, however, is decidedly preferable to the branch exchange in many institutions, especially those covered by one roof, and in which the amount of telephone traffic does not justify the expense of a regular operator. Moreover, the intercommunicating set is at all times ready for instant service, day or night, and in many cases lower in first cost than a branch switchboard exchange equipment.

In the intercommunicating system here described, an effort has been made to produce a design in which the circuits are simplified so far as consistent with first class service, and of rigid, reliable, mechanical construction, as well as of pleasing appearance.

Equipment of this type is manufactured for systems with an ultimate capacity of ten, twenty and thirty lines. Fig. 1 illustrates one of the desk stand equipments of ten line capacity. The selective apparatus, as will be seen, is of the key or push button type, mounted in an enameled steel case. Twelve keys are provided, eleven to be used in selecting the various stations or trunks, the home button in each case being engraved "Ans." The remaining key is used for throwing ringing current upon the line after selecting the desired party. All the buttons are black with the exception of the ringing button, which is red. Opposite the buttons are a series of slots in the key escutcheon, so arranged that typewritten or printed slips may be inserted, bearing the names of the parties served by the system. Each key, except the ringing key, is engaged by a tumbler common to all the keys, when depressed, and held locked down until another key is pressed, when the key previously used is automatically released and returned to normal. A general idea of the key's construction may be obtained from Fig. 2, one end of the tumbler being visible immediately below the top escutcheon plate. Upon each key plunger is a wedge shaped stop, which pushes the tumbler forward as it is depressed, but the wedge shaped portion having passed entirely below the tumbler, a spring throws the latter back to normal, locking the key. The plungers work against a set of special springs mounted below the lower plate, as well as against the actuating contact springs. Long German sil-

ver contact springs are provided, with platinum contacts, and mounted in hard rubber blocks. The ends of the line springs are formed into binding posts, that the line cable may be brought directly into the instrument. This practice

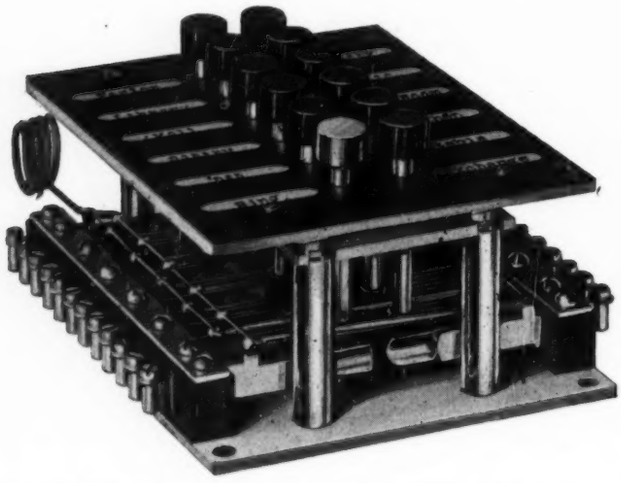


Fig. 2.—Key Which Is the Central Feature of the System.

avoids all soldered connections at the instrument, and greatly facilitates tests for trouble.

The apparatus in the wall type of instrument shown in Fig. 3 is of the same general design, the key being mounted in the face of the cabinet woodwork.

Conforming with modern practice in other branches of the art, the system has been designed to operate upon full metallic circuits. Though the common return switch may be adopted, if desired, the use of the metallic circuit is in all cases recommended, owing to its entire freedom from cross talk or inductive disturbances and especially desirable is the full metallic circuit in case of trunk connections with an outside exchange. For these reasons the metallic circuit system only is illustrated in this article.

An examination of the circuits, Fig. 4, reveals the well-known "Stone" system of furnishing battery feed to common battery lines. The apparatus required under this method of distributing talking battery is extremely simple and of an inexpensive nature.

In tracing out the operation of the circuits, let us assume for example that Station 3 wishes to call Station 1. Key No. 1 of Station 3 is first depressed, and afterward the ringing key. Starting at the signal battery, a circuit may be traced through the upper switch-hook contacts of Station 1 and through its vibrating bell, thence to the inner left hand contact of the answering key for this station, and through a cable conductor to Station 3. Key No. 1 of this station being depressed, the circuit is continued to the ringing key and back to the battery. Should Station No. 1, at the time of this call, have been in conversation with another party, the circuit through the vibrating bell would be open at the upper contact of the switch-hook and Station 3 would be unable to ring. But upon raising the receiver of Station 3, the conversation on line No. 1 would be heard and the receiver replaced. Besides opening the bell circuit of instrument No. 3 when the receiver is removed from the hook, a second set of contacts "make," connecting the primary of the induction coil and the transmitter in series directly across the line corresponding to the button depressed.

In answering the call, Station 1 depresses the answering button, which completes a circuit from the talking battery through the two windings of the impedance coil in this instrument and to the inner contacts of the answering key. At this point the circuit divides, part of the current passing through the local transmitter, and part over the line wires to instrument No. 3. For the information of those not familiar with the action of this type of talking circuit, it may be stated that the impedance coils act as a sort of equalizer, or reservoir, to the battery flow and tend to resist any change in the average amount of current passing, notwithstanding the rapid changes of resistance in portions of the circuit beyond. These coils are of sufficiently high inductance so that the current drawn from the battery for any one connection is of unvarying proportions, regardless of the varying transmitter resistances. For, were a fluctuating current to pass through the battery, the effect of the varying potential would be introduced on the other lines in use at the time and cross talk would result. The proportion of the current flowing in the two paths of the connection beyond the answering key of Station 1, is, of course, inversely proportional to their relative resistances.

Let us assume an instant in the conversation at which one transmitter diaphragm is at the inner limit of its vibration. The line resistance is then at a comparatively low point and the current flow a maximum. But as only a given amount of current can be received through the impedance coils, the current in the other end of the line is correspondingly decreased. Then as the transmitter diaphragm reaches the opposite limit of its vibration, the reverse action occurs and the distant end of the line receives the greater part of the current. The varying current through the primary winding of the distant induction coil induces a current of like character in the secondary, across the terminals of which the receiver is connected. For intercommunicating systems, upon which a connection is desired with an outside common battery exchange, one key is utilized at each regular station for each trunk circuit, the connections being made as for any regular line. In calling the central office, the trunk key is pushed as usual, and the receiver removed from the hook.

Fig. 3.—Wall Set for Intercommunicating Service.

It is in this case unnecessary to use the ringing button, as the central office battery finds a path through the transmitter circuit of the intercommunicating set, causing the line signal to appear in the usual manner. When conducting out-

side or long-distance business, the advantages of the higher voltage main exchange battery is in this way obtained for the system under discussion.

For distributing incoming calls, one instrument is designated as the answering station, and provided with a standard polarized ringer, 2 m. f. condenser and other apparatus, mounted in a small case, as indicated for each exchange line. In the circuit as shown in Fig. 4, Station 1 is wired to perform this function. The polarized ringer and condenser are permanently connected in series across the exchange line, the latter interrupting the path of the battery current through this circuit, but allowing the alternating signaling current to freely pass.

Upon receiving a call, the "exchange" or "trunk" button, No. 1, is pressed and the receiver removed from the hook. The exchange battery now finds a complete circuit through the right hand contact of key No. 1, the 100 ohm. winding of the trunk relay, the lower contacts of the switchhook, transmitter, secondary of the induction coil, left hand contacts of key No. 1, and returning over the exchange line wire. This current energizes the trunk relay, causing two sets of contacts to "make." The first set completes a circuit from the local signal battery, through the second winding of the relay and the switch-hook contacts, causing the relay to be permanently energized, until the contact is broken at the switch-hook. The second set of contacts bridges a 500 ohm impedance coil across the line, which, while the relay is locked up, allows sufficient current to pass so that the usual supervision is maintained at the central office. The inductance of this coil, however, is sufficient to effectually divert the high frequency voice currents to the talking portion of the circuit. A 1 m. f. condenser is also shunted around the line coil of the trunk relay, so that the voice currents will suffer no distortion due to this inductive winding. Being supplied with main exchange battery, the answering station is enabled to converse and receive the number of the instrument desired on the intercommunicating system. Selecting Station 3, for instance, the corresponding button will be pressed, automatically restoring the exchange button to normal, and the ringing circuit then completed to Station 3 in the usual manner. Having disconnected the answering station from the exchange line, it will be seen that the central office would now receive the disconnect signal, were it not for the presence of the five hundred ohm impedance coil just described. The answering station then informs Station 3 to press trunk button No. 1, and having assurance that this has been done, hangs up the receiver. Current flowing through the relay locking coil is interrupted at the switch-hook, and as the armature is released, the impedance coil bridge is removed from the line, in order that the exchange supervisory signals may from this time be controlled by the station called.

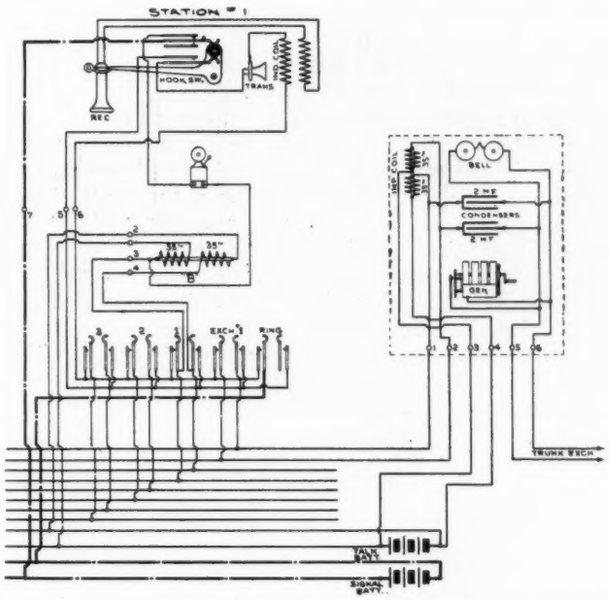


Fig. 5.—Arrangement of Circuit When Trunk Connects with Magneto Exchange.

In case connection is desired with a generator call exchange, an entirely different set of trunk equipment is furnished with the answering station and as the regular intercommunicating set is not provided with a magneto generator, it becomes necessary to call the answering station on outgoing trunk calls, as well as on incoming.

Referring to Fig. 5, a polarized ringer is permanently connected the answering station from the exchange line, it will be seen that the central office would now receive the disconnect signal, were it not for the presence of the five hundred ohm impedance coil just described. The answering station then informs Station 3 to press trunk button No. 1, and having assurance that this has been done, hangs up the receiver. Current flowing through the relay locking coil is interrupted at the switch-hook, and as the armature is released, the impedance coil bridge is removed from the line, in order that the exchange supervisory signals may from this time be controlled by the station called.

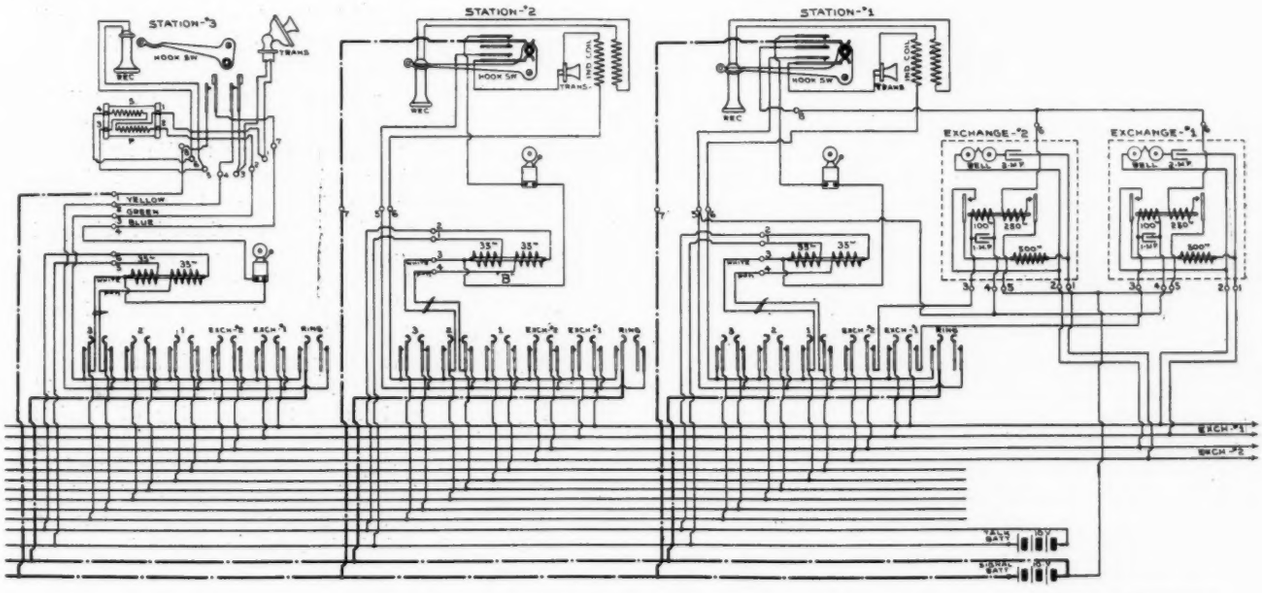


Fig. 4.—Intercommunicating System, Wired with Metallic Circuits, with Trunks to Common Battery Exchange.

In case connection is desired with a generator call exchange, an entirely different set of trunk equipment is furnished with the answering station and as the regular intercommunicating set is not provided with a magneto generator, it becomes necessary to call the answering station on outgoing trunk calls, as well as on incoming.

Referring to Fig. 5, a polarized ringer is permanently connected across the exchange line, and also a standard bridging type magneto generator, the circuit through which is normally open at the shunt springs. Upon answering an incoming call, the trunk key of the answering station is de-

pressed, and the talking current is obtained through the windings of an impedance coil mounted with the trunk equipment in the same manner as with local connections. The presence of a condenser on either side of the circuit beyond the impedance windings prevents the flow of the local battery current out over the exchange line, while offering no opposition to the talking currents.

Upon outgoing trunk calls, the answering station is first called, this station signaling the main exchange, and specifying to the calling station what trunk circuit has been selected, when the latter depresses the corresponding key.

Two distinct sets of battery, as will be observed, are required for the operation of this system, one for talking current exclusively, and the other for signaling. The batteries are each ten volts potential upon systems in which the maximum distance between stations is from 1,000 to 1,200 feet or less, the voltage being slightly raised upon systems of greater length. Any first class type of battery is adapted to the operation of such a system and should be placed, if possible, somewhere near the center of the system. Current is usually distributed to the various stations through No. 16 B. & S. conductors contained in the same cable with the line wires, the latter being of No. 22 gage twisted pairs. The apparatus and circuits described in this article are those recently developed and placed on the market by the Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., and adopted as their standard equipment for intercommunicating work.

Some Telephone Problems.

At the convention of the International Independent Telephone Association, Prof. Morgan Brooks, of the University of Illinois, and one of the managers of the American Institute of Electrical Engineers, gave a brief talk which was listened to with keen interest. He said among other things:

"The rapid growth of telephony is due largely to the ability of engineers to solve the numerous problems that have arisen. The first magneto telephone transmitter was a very weak instrument, depending, as it did, upon the voice vibrations for its total energy. Soon the microphone transmitter was produced, where the voice merely controlled the energy of a battery, giving promise of magnifying the volume of transmitted sound to any desired extent. Even yet we have not succeeded in arranging the mechanism of the transmitter so that the controlling contact may carry more than a very small current. The induction coil helped materially in the function of increasing potential for transmission, anticipating by many years the use of step-up transformers in electric power transmission.

"Switchboard problems were prolific of many patents in the eighties. The telephone switchboard has been rapidly and continuously improved, until today, while an intricate affair, its efficiency is remarkable. It is strange that our telegraph companies are still using the old brass-strip boards in view of the object lessons set them by telephone engineers. Switchboards have been so greatly improved, by reason of competition, that they leave little to be desired in rapidity of service. Where the actual operation is a matter of so few seconds compared with the many seconds taken in responding, the next move should be to shorten that interval. The probable future development in switchboards, both manual and automatic, will be in the direction of greater perfection, already partially accomplished through central energy, and will possibly result in a combination of the best features of all types.

"Cross-talk became a serious problem almost from the beginning of telephony. The telephone engineers returned promptly to the metallic circuits used in the early telegraph. Parallel wires introduced still further problems, solved by elaborate transpositions, extending today even to the amazing feat of transposing phantom circuits. Induction from electric lighting and power circuits modified transposition methods, and today the introduction of the grounded circuit high-tension alternating railway system has raised still further problems in line adjustment. The result of so much telephone line engineering has brought the standard of line construction to a high plane, and it is a fact that any telephone company can use its wires for telegraphy, whereas the converse is not true. The opportunity for the use of telephone wires for simultaneous telegraphy is only recently becoming appreciated and utilized. Long distance companies can easily increase their revenues by cultivating this double crop.

"Early competition between the telephone and telegraph was stifled by the remarkable agreement between the monopolists of the two services to abstain from entering each other's fields. Each progressed unmolested upon its own course. With the expiration of the fundamental telephone patents competition arose, invention was greatly stimulated, and it was proved that profits could be made at much lower rates than had previously prevailed. The growth of the telephone was accelerated beyond even the dreams of the most optimistic. The private branch exchange was introduced, and the farmers' lines spread over the country wherever wire fences existed. Two competing telephones were cheaper than one alone had been, and the service was greatly improved. Competition in long distance business is only just beginning, and with the simultaneous telegraphic possibilities, the use of 'long-distance' will soon cease to be a luxury, or only justified by business of great magnitude.

"Many of the present problems of telephony are those of commercial engineering rather than technical questions. The anticipation of the future growth of a city, the adjusting of equitable rates between small and large users, municipal or state regulation of service rates, the simplification of records, the interchange of business between connecting companies, even the compulsory interchange between rival companies are all problems of importance.

"Nevertheless there are technical problems yet to be solved. The coming substitution of steel or concrete for wood in pole construction demands the experimental determination of sag, spacing and strength of wires suitable for the longer spans that will surely come into use. The inflexibility of the new type of pole may require some sort of flexible support for the wires, such as is rapidly coming into use in power transmission lines. What are the commercial limits of underground cables if Pupin coils be used? Can any substitute for these anti-capacity coils be found?

"Another class of problems is forced upon the toll-line companies by the increasing presence of high-tension power lines. Primarily there is the grave danger to life and property by possible crosses at intersections, a hazard that will rapidly increase as the power lines become weakened by deterioration. Some of our power engineers seem to have but faint realization of the chances they are taking in unprotected crossings of telephone circuits, and the telephone engineers are resting in ignorant security, simply because few accidents have as yet occurred. Standard methods of making crossings safe could be determined by experts and regulations published.

"Unlike the old arc-lighting circuits, the extremely high potential now employed makes the possibility of shock from a static charge, without actual contact, dangerous, as proved by the precautions taken by electric power companies with respect to their own telephone wires. Some construction that I have seen is so dangerous as to suggest criminal ignorance; one can hardly believe it criminal carelessness. Subordinate to the actual hazard of such proximity comes the interference troubles due to induction, and these are very serious from the single-phase grounded railway circuits.

"Some may be unaware that at the University of Illinois an Engineering Experiment Station has been established with equipment for making any engineering experiments likely to prove of use to the public. Questions of public safety are

obviously appropriate, and the station staff will be very glad to receive information as to menacing conditions in telephone circuits or accidents that may have come under the notice of members of the Association. The knowledge gained from such collected information would enable a useful bulletin to be prepared. Such publications in telephony and other fields of engineering activity will make the facilities of the University more generally useful to the state."

Santa Fe Railway Adopts Telephone Dispatching on Entire System.

The management of the Santa Fe Railroad has decided to operate its entire main line from Chicago to the Pacific Coast by telephone instead of by telegraph. Arrangements are being made for the change as rapidly as the work can be conveniently done.

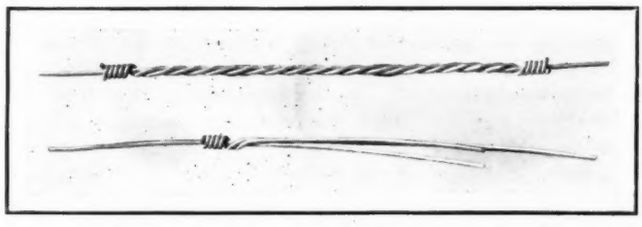
Contracts have been let for the installation of the telephone wires between Emporia and Kansas City, a distance of 205 miles. The company is now operating its trains between Emporia and Newton, a distance of seventy-three miles by the new system. As soon as the installation to Kansas City is completed the work of putting in the necessary apparatus between Kansas City and Chicago, a distance of 454 miles, will be begun. The substitution of the telephone for the telegraph will cost the company at least $2,000,000, but the saving which will be effected will more than offset this expenditure.

The substitution is being fought desperately by the telegraphers' union, which claims that it is an unsafe way to operate trains. In the West the telegraphers are trying to interest the state legislatures against the move. The Santa Fe and other roads, however, have the recommendation of the American Railway Association back of them.

LETTERS ON PRACTICAL SUBJECTS

The Three-Wire Splice.*

I am much interested in the discussion of "Bad Joints" on page 641, of the December 19 TELEPHONY, and while I am compelled to agree with the writer of the article that the latter design of splice is infinitely better than the first two shown, yet I am sure he is not living up to the possibilities in good splices. From my observation I find that the three-wire splice is 100 per cent better than any two-wire



A Three Wire Splice and Method of Making It.

splice. A three-wire splice is made by cutting an extra piece of wire 12 inches long and placing it along side of the other two ends, then placing connectors about three inches from either end and then wrapping both free ends around the line wire. The connectors are then placed at the other end of the splice and the other two free ends wrapped around the line wire. The connectors are then placed on the wrapped ends and with a pair of cutters placed lengthwise with the splice at the opposite end, and taking hold of one of the free ends, the splice is twisted firmly together. The space between the wrapped ends is about 5 inches, but this space is, of course, tightly wrapped together, making a perfect joint in every way. Soldering, of course, improves the joint if properly done.

Disko, Ind. E. L. HARMAN,
Sec'y and Mgr. Disko & Laketon Tel. Co.

*Editor's Note.—All "two-wire" iron splices should be soldered. Very often a "tin-foil" joint, or a "three-wire" splice is made, and satisfaction is reported if the work is well done. We should like to hear from anyone who has had trouble with joints of either of the two latter types.

An Answer to Mr. Shepherd's Comment on Wave Distortion in the Carbon Transmitter.

With regard to the comments of Mr. G. M. Shepherd upon my article in TELEPHONY of November 21st, I will say that I gave equations (9) and (13) as pointing to the form taken by a solution of the problem in hand, in the hope that it might furnish a beginning of this study and that some friendly critic would suggest a better solution or a fuller interpretation. The rather unsatisfactory form taken by the complicated solution given in equation (9) led me to give the approximate solution.

The expansion of equation (6) is, to be sure, by the exponential series. This series is got originally by Maclaurin's theorem. When writing, I tried to keep in mind the reader whose mathematics was a bit rusty and so I gave the original source of this expansion.

As to the convergency of the expression obtained by me as well as that given by Mr. Shepherd (both of which are correct) he is in error. The exponential series is

$$\epsilon^x = 1 + x + \frac{x^2}{|2} + \frac{x^3}{|3} + \ldots\ldots + \frac{x^n}{|n} + \ldots\ldots$$

The ratio of the $(m+1)$ th term to the m th term is x/m. This ratio may be made as small as we please by making m large enough, that is, by taking terms enough. A point can, therefore, always be reached beyond which the succeeding terms decrease more rapidly than those of any given geometric progression. The exponential series is, therefore, convergent for all values of x.

The square bracket should have been placed after the K in equation (9). The variable expression within the brackets, increases with t while the exponential factor decreases, so that the expression for I can not be said to be evanescent. The form actually represented by equation (9) could best be found by plotting the equation.

The best test of the conclusions given in my paper will, of course, be experiment. A source of sound giving a pure tone, that is a sinusoidal wave, should be used. The *phone* devised by Professor Webster, of Clark University, would serve this purpose very well. This apparatus consists of a Helmholtz resonator, having a diaphragm across the back of it and this diaphragm driven directly, by means of a very light rod, by a tuning-fork of the same pitch as the resonator. The voice is not at all suitable for such experiments. An untrained voice is an irregular and uncertain affair at best and the beauty of a well trained voice is in its harmonics. The "hollow" quality of a baritone singing an *open tone* on too high a note, is a good illustration of a tone without harmonics. I am not able at present to carry out the experimental tests of my theory and so have published the theory itself with the hope of furthering the study.

Bruce V. Hill.

How to Keep Cabinet or Switchboard Doors Easy to Put in Place.

By cutting off the lower corner of a cabinet or rear switchboard door just enough so it can not be seen from the front when the door is in place the door can be made to slide back and forth easily. When this is done the little clippings of wire, etc., which frequently fall into the slot of a door shoe will not tip the door so as to prevent the other doors from easily fitting into place.

Texas. E. E. F.

The Telephone in the Courts

Conducted by A. H. McMillan

Billingsgate and the Telephone.

Enclosed please find copy of letter received from one of our subscribers some time ago which explains itself; also find Article 17 of our by-laws. The directors do not want to pay any attention to this unless they are compelled to, as the two families are not on the best of terms and, if we are obliged to push it, it will make considerable trouble. Our company is now under reorganization.—C. W. W.

The letter enclosed is as follows:

To the Board of Directors of the P—— B—— Telephone Company:

"On Sept. 17, 1908, Mrs. E—— called me on the telephone and accused me of saying some things I was not guilty of, which I denied. She contradicted me four times and the fifth time called me a liar. If this is in the by-laws of the company, please let me know; otherwise fine her according to the rules of the company, as I am no liar and will not stand the same."—Mrs. G.

Article 17 of the by-laws reads as follows:

"Article XVII—No abusive, profane or obscene language shall be permitted to pass over the line. Any person so offending shall be fined the sum of one dollar and shall be deprived of the use of the line until the fine is paid."

The telephone company under the by-law above quoted is not obliged to pay any attention to the communication. We doubt very much whether four contradictions and one epithet of "liar" constitutes abusive, profane or obscene language under the by-law of the company. It is nowhere made obligatory on the company to enforce the by-law nor is the company or its manager really competent to decide what constitutes the terrible language forbidden. The exigencies of the telephone business as observed by the writer during his experience as counsel for telephone corporations seem to sometimes require stronger terms than those your good subscriber objects to. Had there been five contradictions and two epithets of "liar" our opinion might be different. We suggest to our readers this query; if one woman contradicted four times and said "liar" once, how many times did the other contradict and what reply did she make to the opprobrious term?

Exclusive Franchise.

I have an injunction out against another company from coming into town. My contract with the city says they can come in, but must come on my poles and on my switchboard, but they want to come in and start another telephone exchange. I have an exclusive franchise and pay the city so much for it each year. Any opinions of courts you can get me favorable to my side, please do so.—W. C. M.

The validity of your franchise in its exclusive features depends in a large degree upon the charter of the municipality in which you are acting. Without that before us we cannot give an opinion of much value. If the municipality has power to grant such a franchise you are safe under its terms. The following cases may be of assistance: American Tel. & Tel. Co. vs. Morgan Co. Tel. Co. (Ala.), 36 S. 178; Robinson vs. City of St. Thomas, 123 Ont. 489.

Pole and Wire Taxes and the Municipality.

We have noticed in issues of TELEPHONY and also the American Telephone Journal decisions that have been handed down with regard to a pole and wire tax in a municipality. Our proposition here is that we have a franchise in which we agree to give the city thirty free telephones, which we are doing and have done for years past. They now present us with a bill of 10 cents per mile for wire and 10 cents for each pole. We believe that this has been tried before and that the courts have not sustained the cities in their claim for this tax.

Will you kindly send us as soon as possible a few decisions which you think are in line with the proposition as above stated? —K-B Tel. Co.

Below are some decisions that we hope will be helpful: Wisconsin Telephone Company vs. Oshkosh, 21 N. W. 828; Fort Smith vs. Hunt, 82 S. W. 163; Saginaw vs. Swift Electric Light Co., 113 Mich. 660, 72 N. W. 6; Schellsburg vs. W. U. Telegraph Company, 26 Pa. Sup. Ct. 343; Pittanning vs. W. U. Tel. Co., 26 Pa. Sup. Ct. 346; Wisconsin Telephone Co. vs. City of Milwaukee, 104 N. W. 1009; Postal Teleg. Cable Co. vs. Taylor, (U. S. Sup. Ct.), Adv. Op. (L. Ed.), No. 5, page 208; St. Louis vs. W. U. T. Co., 148 U. S. 92, 149 U. S. 465; Memphis vs. Postal Teleg. Cable Co., 139 Fed. 707; Ogden vs. Crossman, 53 Pac. 985; Pensacola vs. Southern Bell Telep. Co., 37 Southern 820; Postal Teleg. Cable Co. vs. New Hope (U. S. Sup. Ct.), 5 Adv. Op. (L. Ed.) 205; New Orleans vs. Great Southern Tel. Co., 52 La. Ann. 1082 Am. St. Rep. 387, 27 So. 590; W. U. Tel. Co. vs. Philadelphia, 21 Am. & Eng. Corp. Cas. (Pa.); McMillan on Telephone Law, Sec. 206.

Query as to Title and Court of Case.

In the American Telephone Journal of July 25, 1908, you mention editorially under the heading "Lightning Injury and Responsibility," a case recently tried at Richmond, Va., but you do not give the style of the case nor where a report of the case can be found.

May I ask you to say where I can find a report of the decision and the style of the case?—S. A. L.

The case covered by the editorial was tried in the Law Equity Court of Richmond, Va., on or about June 1st, last. The plaintiff was J. H. Latham, of Manchester, Va., and the defendant was the Southern Bell Telephone & Telegraph Company. The suit resulted from an accident sustained by the plaintiff when using the telephone in the Southern Railway Yards, at Alexandria, Va., about two years previous to the suit. Kendall Weisiger, assistant chief engineer of the defendant company and two other experts were witnesses for the company and their testimony materially assisted in securing a favorable decision. The case lasted two days, but the jury was out only fifteen minutes before bringing in a verdict for the defendant.

Municipal Assent Cannot be Shown by Parol.

Express municipal assent to the occupation of a city's streets by a telephone company can only be shown by formal municipal action, and not by mere general declarations of witnesses that such municipal assent was given. Hence, verbal statements of witnesses that certain improvements were made or work done "with the full knowledge and consent of the municipal authorities * * * including the mayor and council of said town" and that a telephone company had established and maintained in the town a telephone system with wires and other fixtures in, on and over the streets, "all by the consent of municipal authorities of said town," and that a witness who has been a member of the common council and of a committee thereof, has designated and pointed out in the streets of said town where to locate the poles and wires" received his authority to do so from the town council of said town in regular meetings" and other like statements, were not admissable in evidence. Hence a judgment against the town of Pelham, Ga., and in favor of the Pelham Telephone Company was reversed by the Supreme Court of the state. Town of Pelham vs. Pelham Tel. Co., 62 S. E., 186.

Discrimination May Exist by the Mere Enforcement of a Just Rule.

A patron of a telephone company may be unjustly discriminated against in the use of a telephone exchange by the mere enforcement against him of a just and proper rule, it being ignored in favor of others in like situation. This was a ruling of a Supreme Court of Iowa in an action against the manager of a telephone exchange who was in charge of the switchboard and used his position to inconvenience one of the patrons of the company. The court also held that the fact that the defendant was merely an employee of the company did not operate as a defense, especially where the employee acted perversely, without authority, and to gratify his own personal spite. Plummer vs. Hattelsted (Ia.), 117 N. W., 680.

Practical Questions and Answers

Sulphating of Storage Battery Plates.

What causes the grayish coating on the positive plates of a storage battery? The battery appears to be in perfect condition in every way, except the color of the plates. When rubbed off the top of the plates with the finger, they show a dark or brownish red instead of a dark brown. I have noticed this many times before on other installations, so do not think that it is anything very serious.

The light colored coating on the positive plates is due to sulphated lead and may or may not indicate something wrong depending upon the amount and location. An expert of the Electric Storage Battery Company, commenting on your inquiry, says that under normal conditions, a light colored deposit collects on the horizontal surfaces of the positive. This consists of the same material as the sediment in the bottom of the jars or tanks which has been carried up by the gassing, and become lodged on the plates instead of falling to the bottom.

Where the vertical surfaces become light or mottled in color, this is an indication of insufficient charge or an impurity present in the electrolyte, and this condition should be corrected as it indicates something wrong.

Lines of Force in Generator Armature.

As in the case of magnets, the center of an armature of a telephone generator possesses very few lines of force, and this accounts for its peculiar shape. Is this true?

No, the center of the generator armature must carry as many lines of force as possible, for all these lines are cut by the wire during each revolution, and this generates the voltage. If there are many lines, there will be a large voltage, if few lines the voltage will be small. The peculiar shape is largely the result of the necessity for high voltage in a small dynamo. If the telephone hand generator were required to produce but a few volts, the armature might well be shaped as shown in Fig. 1. *M M* are the steel magnets, *P P'* the pole pieces, *S* the shaft, on which is mounted the armature core, *A*, which is a cylinder with two slots, *W W*, in which the wire is wound. The great volume of iron in the armature core would allow a strong magnetic flux to flow from *P* to *P'*. The small size of the slots, *W W*, would not greatly affect the flux, so that we would get a relatively high voltage generated *per turn* of wire in the slots. And the shape of the voltage wave would be as nearly a sine wave as practicable. But since the space in the slots is small, not many turns of wire can be accommodated.

To get the higher voltage which the telephone bell demands we must enlarge the slots, *W W*. In the modern machine we have carried the enlargement of the slots to the extreme shown by Fig. 2. Here it looks as if there is more slot than core, and it is true that the limit has been reached. In enlarging the winding space we have secured more turns of wire, but we have weakened the magnetic flux by reducing the amount of iron. It is evident that the steel magnets, *M M*, can not cause as much flux to pass through the narrow core of the armature, *A*, in Fig. 2 as they can through the generous proportions of *A* in Fig. 1. Yet the form in Fig. 2 will give the higher voltage, for the loss in flux is not nearly as great as the gain in number of turns.

But we can not with safety reduce the amount of iron any more, for both wave form and voltage will suffer.

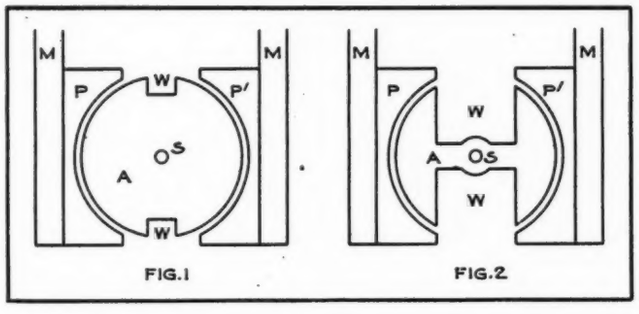


FIG. 1 FIG. 2

TO WIRE CHIEFS AND MAINTENANCE MEN.

Clearing of troubles which occur in your exchange, inside or outside, may be made the subject of short, practical letters which will interest other telephone men These TELEPHONY *will gladly publish, if illustrated by diagrams or photographs. Simply write a description of the nature of the trouble, tests and location, cause found, and method of repair. Payment will be made for all letters published.*

Charging Low Voltage Battery in Parallel.

I have two 2-volt 22½ ampere storage batteries which give out 190 watts and a charging machine giving out 125 watts. I want to know if these batteries may be connected in multiple and charged successfully. These batteries measure 2 volts and 22½ amperes in multiple, or 45 watts. They are of the Electric Storage Battery make, type D, with 4 positive plates, and the charging rate is 2½ amperes per plate.

The statement of conditions needs some revision. Type D battery when equipped with four positive plates has a total of nine plates. Its normal rate for charging and discharging is ten amperes. If you put them in parallel it will take 20 amperes to charge them at full rate, though they may be successfully charged at half rate. To compute the power in watts multiply the current by the voltage. This gives 40 watts for the two cells, no matter whether in series or parallel. Your 125 watt generator will charge them both at once if its voltage and current capacity are proper. If the cells are in parallel, you will need only about 3 or 4 volts, since the cell voltage runs up to 2.50 when fully charged. The voltage may be higher, but the dynamo must carry 20 amperes without overheating. If in series, you will need from 6 to 8 volts, and the dynamo must carry 10 amperes.

Transpositions Need Not Be Made Spirally.

Will you please explain why in transposing metallic circuits as seen going from the observer, the left-hand wire is continually passed to the right and over the other, making a complete twist in two transpositions. Why not pass it over and back? Would not the effect be the same?

So long as the two wires of the metallic circuit change their positions from one side to the other it is not material for electrical reasons that one wire shall pass around the other, in order to make an effective transposition.

The making of the rule to throw the transpositions in this way insures that all transpositions shall be thrown in a uniform manner, and make it possible to check the location of wires more easily and surely.

The effect on induction between wires or between circuits will be the same if one wire is passed over the other at one transposition and then back over it at the next.

The theory of transposition lies in the neutralization of inductive effect upon a metallic circuit from a disturbing source by exposing the two wires of the circuit equally to the disturbance. The relative position of the two wires at crossing points is not concerned.

Telephone News

Governor Marshall's Recommendation for Indiana Franchises.

Governor Marshall, in his inaugural address recommended to the Legislature that hereafter municipalities should be prohibited from granting franchises to public service corporations until the price the public is to pay to enjoy them is clearly defined, and the municipality is permitted to share in the profits arising therefrom. When those things have been provided for, no second franchise should be granted until the first has been annulled for fraud or failure honestly and efficiently to serve the public.

Telephone Companies in New York May Be Placed Under the Public Service Commission.

Governor Hughes, of New York, in his annual message to the legislature recommends that the public service commission law be extended as to its provisions, to include telephone and telegraph companies. Governor Hughes says that these two classes of public service corporations should be brought under appropriate regulation as to rates, service and other matters to which railroad companies are now subject. This is the second time that Governor Hughes has made such recommendation in his annual message.

Proposed Telephone Legislation in Texas.

Representative Chester H. Terrell of San Antonio, Tex., will introduce a bill into the legislature which is intended to do away with the so-called "two-telephone nuisance" where there are two telephone lines in one city. The law provides already that these lines shall connect for the exchange of long distance business and it is Mr. Terrell's idea to make the same law apply to local business.

Indiana Legislature's Telephone Committee.

The regular biennial session of the Indiana Legislature convened January 7, and both houses organized promptly and without any unusual incident. The presiding officer of the Senate announced the following Committee on Telephones and Telegraphs: Senators Springer, Strange, Pearson, McCallum, Benz, Bingham and Clark.

A bill has been prepared and will be introduced in the Legislature this week which provides for the enlargement of the powers of the Indiana Railroad Commission so that it may have supervision over the rates charged by telephone companies as well as other public service corporations.

New York Public Service Commission Forbids Rate Discrimination.

Although the telephone business of New York state is not under the supervision of the Public Service Commission, the rulings of that body with respect to other classes of public service corporations are of some interest to telephone men. Following a recent investigation, the commission has issued rulings broadly prohibiting electrical corporations from practising rate discrimination in any of its recognized forms.

Minnesota Telephone Companies Discontinue Telephone Toll Coupon Books.

The sale of telphone coupon books has been discontinued by the Northwestern Telephone Company and the Tri-State Telephone & Telegraph Company of Minneapolis. Early in December George W. Peterson, assistant attorney general, gave an official opinion that the discount on these coupon books was in violation of the Minnesota anti-pass law, which became effective the first of the year. The companies ordered the books discontinued, although the expert opinion of telephone company attorneys was that there was no discrimination in the sale of books that was open to every one. The Minnesota law read in such a way that it was deemed best to comply with the exact test. If there is a demand for the books their use may be continued, at regular rates, for the convenience of jobbing and manufacturing concerns who prefer to give books to their traveling men instead of expense money to pay for the telephone tolls.

Members of the Indianapolis Stock Exchange Adopt Resolution Favoring Telephone Competition.

After the last call of the Indianapolis Stock Exchange for 1908, the members of that body went into closed session with A. W. Thomson, acting president, in the chair. A resolution asking that the prayer of the Indianapolis Telephone Company for a modified franchise be granted, and that the resolution be mailed to Mayor Bookwalter and to the city council, was passed by a unanimous vote of the members present. It will bear the signatures of the entire membership of the Stock Exchange. In short talks preceding the vote, the brokers took the position that competing companies were necessary; that the amalgamation of the two companies would give one company too much leeway in the matter of rates.

Secretary Otto Haueisen was instructed to prepare the resolution praying that both companies operating within the city limits be kept intact, and that the Indianapolis company be granted some relief from the existing clauses of the old franchise.

Fair Financing at Lincoln, Neb.

Critics of corporation financing will be able to find little fault with the method of combining local and long distance companies of Lincoln, Neb., whereby all stock is put on the same basis, and over $200,000 of securities, representing promotion fees in the old companies, has been discarded. The importance of this movement can not be over-rated, and the significance of this act of some of the leaders in Nebraska Independent telephony is appreciated not only in Lincoln, but is being considered carefully in many other parts of the country. Frank H. Woods, president of both the old, and the new companies in a statement relating to the consolidation said:

"We shall issue but one kind of stock, namely, common stock, and for every share of stock that is issued, the company will receive $100 in cash. Stockholders will receive no bonus or profits of any kind except the dividends they will get upon their stock. The old corporation, the Lincoln Telephone Company, is capitalized at $1,041,000, of which $641,000 represents bonds and preferred stock outstanding and $400,000 of common stock. The price paid by the new company was $841,000, which reduces the capitalization $200,000. In other words, the deal carries into the new company but $200,000 of the common stock of the old company. Perhaps a little history of this concern will make plainer the point I wish to make.

"The Lincoln Telephone Company was organized in April, 1903, at which time it received a franchise from the city of Lincoln. During the winter and fall its plant was constructed at a cost of $400,000 of bonds and $400,000 of common stock. Two hundred thousand dollars of this stock was used for promotion purposes and covered the expenses of organizing and promoting the company. Four hundred thousand of bonds and $200,000 of the stock was sold on the open market, mostly in Lincoln, at the very best price

obtainable. No actual money was paid the promoters for their services. The bonds and stock sold brought good prices, in all cases at least $900 for a $1,000 bond and $500 of stock. Persons who invested did so at considerable risk. The exchange had to be installed in the face of strong competition, without long distance lines and without surrounding Independent plants to support it. It was, in fact, experimental in a very high degree.

"Competition, as I said, was strongly intrenched, it had a system covering a large part of the state, it was tied up with most of the public service corporations, politically and otherwise, and nearly all of the state, county and city officials were receiving free service from it. To secure business controlled through these sources was a herculean task, and it has involved a tremendous amount of effort, not only in this county, but in building up a system throughout the entire state. With the aid of progressive legislation enacted in recent years and by the employment of straightforward tactics, we have succeeded in disrupting our competitor from its strongholds and in building up a first class telephone system in the county and in the state, of which latter system the Lincoln Telephone Company has formed a part.

"It was six years ago that this task was begun, and during that time none of the men who invested in the company have received a cent outside of the 6 per cent interest on their bonds. Not a dollar of dividends has ever been declared on the common stock. Not a cent has been paid the men who promoted the enterprise, nor have they enjoyed any profit either directly or indirectly, for their services in establishing and building up the enterprise; and with the exception of a nominal salary paid the president during the last few years, they have never received any compensation for their work in managing and building up the business since the plant has been a going concern.

"For the first time in its history the company is now in shape to begin the payment of small dividends on its common stock. But in the time between the issue of that stock and the present sentiment as regards public service corporations has entirely changed. The methods adopted in the financing of the plant, although acquiesced in and approved then, no longer are given public approval. It is now charged that the common stock is 'watered', and that its holders are entitled to no dividends. If any properly constituted authority such as the State Railway Commission, should sustain that contention, the result would be to deprive investors of a profit to which under ordinary business standards they are honestly entitled and to deprive others of payment for services honestly given.

"We have no desire to engage in any such contention with the public. Law suits are expensive, and a corporation of this character, dependent in such large part upon public good will, would suffer heavily even if it won its point. We believe it is better to conduct the business along those lines which meet with public approval, and our company proposes to make an honest effort to carry out this plan. By the time the transfer is complete, about $100,000 of this common stock will have actual cash put into it by the surplus which has been accumulated by the Lincoln Telephone Company during the five years of its operation. The other $100,000 represents the only profit the investors and promoters receive for their risk and their services. As a matter of fact this value now actually exists in the Lincoln Telephone Company, representing its value as a going concern, with an established business that will pay dividends upon this valuation and at the same properly maintain the plant. The amount of profit thus taken is less than the railway commission would allow us if the matter were submitted to that body, since it allowed the Citizens Railway Company a 25 per cent construction profit when their operations had extended less than two years, while ours, at the most, would figure but 12½ per cent for operations extending over six years.

"Since its initial construction the Lincoln Telephone Company has sold its bonds and preferred stock without bonus of any kind, and every dollar has gone into the plant. The company has at present outstanding $583,000 of bonds, $58,000 of preferred stock, $400,000 of common stock, $50,000 outstanding indebtedness and a surplus of $85,000.

"One of the least understood points about a big going concern is the demand for new capital. For instance, the company must spend $100,000 a year in the enlargement of its plant to meet the demands for additional service. What the public insists upon first from corporations of this kind is service, the getting of a telephone installed when they wish it. These extensions cost money and they will not wait upon the slow growth of the company in earning the money to install them. We tried finding a local market for our preferred stock, but the fact that the suspicion of 'water' clung to the old common stock issue prevented this being very successful. We now propose to meet this attitude of the public.

"There is just this point I wish to make clear: The new corporation is modelled along those lines that express the soundest public sentiment of the times. No watered stocks, no bonuses, no inside syndicate, no promotion fund. All of the stock will be fully paid up and will participate rapidly in whatever earnings the railway commission will allow. We will probably take in some other plants, but they will be acquired upon the same basis as that by which the Lincoln Telephone Company was secured, with all of the 'water' or anything that had any semblance of 'water' squeezed out of it. We propose to manage the company conservatively, out in the open and we believe that as we shall treat the public fairly we should receive its commendation and support. We are doing this, voluntarily, we are doing it because we believe the policy is a correct one, and forever disarms criticism of the sort overcapitalized corporations must expect."

Sterling Electric Company Wins Important Patent Suit.

Judge Kohlsaat of the United States Circuit Court of Illinois, has just decided the case of the Sterling Electric Company vs. Western Electric Company in favor of the Sterling. This is a signal victory for the Independents, in a case which has aroused the keenest interest in all parts of the field. In an interview with a representative of TELEPHONY an official of the Sterling Electric Company has made the following statement:

"When the Sterling Electric Company, of Lafayette, Ind., decided to enter into the common battery multiple switchboard business, some eight years ago, it thoroughly investigated every system then in use or offered for use. After experimenting and making trials, a positive proof of systems, it entered into negotiations with S. B. Fowler of New York for the exclusive use of his bridged relay multiple system, which was new, novel, simple and efficient. Through the stupidity of one of the officers of the Sterling Electric Company, some of the Bell engineers were consulted regarding the merits of this circuit, and the Western Electric Company, which is the Bell Manufacturing Company, immediately proceeded to attempt to patent this circuit, fully realizing that it was new, novel and, as we believe, something decidedly better than anything they had ever used or conceived, and, further appreciating the fact that equipment using that circuit could be made at a less cost and maintained at a less cost than other multiple circuits then used by it. It put in patent papers covering the Fowler circuit some months after the Sterling Electric Company had commenced to manufacture the equipment.

"Upon Mr. Fowler's attempting to prove his case in the patent office, he discovered that he had strong interference. The Western Electric Company commenced to institute infringement suits against the Sterling Electric Company, and some of the operating companies who had purchased and were operating common battery multiple switchboards manufactured by the Sterling, and employing the Fowler circuit in question.

"The first of these suits was instituted in 1902, the Western Electric Company bringing injunction proceedings against the Galesburg Union Telephone Company of Galesburg, Ill., asking the Court to restrain that company from using the Sterling equipment, claiming that it was an infringement upon the Scribner patent. This case was fought bitterly and carried to the court of last resort, in each court the decision being in favor of the Sterling Electric Company. Inasmuch as the Western Electric Company recognized in the Sterling Electric Company a very formidable foe, and recognized the value of its equipment, mechanically and electrically, and its ability to aid Independent telephone operating companies to give a high grade service at a low cost, it adopted the course of what looked like persecution against the Sterling Electric Company; instituting a suit against the Home Telephone Company of Toledo, Ohio, the suit being brought in the United States Circuit Court at Cleveland, for the purpose of estopping the Toledo Home Telephone Company from using the Sterling Electric Company equipment with the Fowler circuit. Incidentally, at that time the Toledo Home Telephone Company had three times as many subscribers as the Bell company at Toledo.

"About this same time the Western Electric Company brought suit against the Sterling Electric Company at Indianapolis, for the purpose of enjoining the Sterling Electric Company from manufacturing the common battery multiple equipment, using the Fowler circuit. All this time the Western Electric Company was vigorously pushing and fighting the interference proceedings in the patent office, and, through the District Court at Washington, trying to force its own patent to issue. It succeeded in getting the patent issued to Mr. McBerty, who in turn assigned it to the Western Electric Company, the patent being on this identical Fowler circuit. Being so sure of its ground, with monopolistic conceit, the Western Electric, or Bell Telephone Company, during the two or three years of this litigation, installed the Fowler circuit in exchanges in the offices of Bell sub-license companies, recognizing the advancement of the art shown in this conception, and recognizing its commercial value. It probably has a half dozen exchanges using this system. As the litigation against the Sterling began to assume a more dangerous form and looked favorable to the Sterling, it hesitated before installing any more equipment using this well known Fowler circuit. Promptly upon the issue of the patent to Mr. McBerty, for the Western Electric Company, the Western Electric Company instituted another suit against the Sterling Electric Company in the United States Circuit Court at Indianapolis, for the purpose of permanently enjoining the Sterling Electric Company from manufacturing equipment using this Fowler circuit. The Sterling Electric Company, which has had experience in fighting, did not propose to be bluffed, or browbeaten by the Western Electric Company out of the use of what it believes to be the best multiple circuit known in the modern telephone art, simply because the Western Electric Company had appropriated, and had succeeded in getting patented this Fowler circuit.

"The Sterling Electric Company, following the precedent of only one or two similar cases known in the annals of the equity courts, brought suit against the Western Electric Company in the United States Circuit Court of Illinois, at Chicago, demanding that the action of the patent office be reversed and that the patent issued to Mr. McBerty, or the Western Electric Company, be annulled and the grant given to the original inventor, Samuel B. Fowler, the electrical engineer for the Sterling Electric Company.

"This case was one of the most interesting and bitterly fought in the annals of telephone patent suits; it was heard by Judge Kohlsaat; it was argued in the spring of 1908; upon Saturday, January 9, 1909, Judge Kohlsaat rendered his decision holding that Fowler's contentions were sustained beyond any reasonable doubt. This leaves the Sterling Electric Company in its rightful position of owning and controlling the patent covering this valuable circuit; we believe that it leaves the Western Electric Company in the position of using infringing equipment in several of its exchanges. The probabilities are that the Sterling Electric Company will bring injunction proceedings against the Bell operating companies using this equipment.

"This decision is one of the most important that has been rendered in the telephone field and is a decided victory for the cause of Independent telephony. Mr. S. B. Fowler and the Sterling Electric Company were represented throughout by the well known patent attorneys, Brown & Williams of Chicago and their general counsel, John F. McHugh of Lafayette. The Western Electric Company was represented by its attorneys, Barton, Folk & Tanner of Chicago and counsel from Boston. The year 1909 opens auspiciously for the Sterling Electric Company and the users of its common battery multiple equipment."

Pioneer Telephone and Telegraph Company Answer Questions of Oklahoma Corporation Commission.

The Pioneer Telephone and Telegraph Company, which has an alleged monopoly of the telephone business in Oklahoma, has filed with the Corporation Commission, answers to 86 questions made by Henry Willmering, the rate man of the Commission, in regard to its statement for the fiscal year ending July 1, 1908. The answers occupy 250 closely written typewritten pages, the answer to one question taking 130 pages. The legal and auditing departments of the telephone company have been working for months on this report. Under the Oklahoma constitution, all public service corporation companies must give such statements and answer such questions relative to its affairs as the Commission may deem necessary. These reports are made and subscribed by the officers of the companies under oath. The answer to the question of ownership discloses that it is a corporation and that the American Telephone and Telegraph Company owns 20,220 shares out of the 24,623 in the corporation.

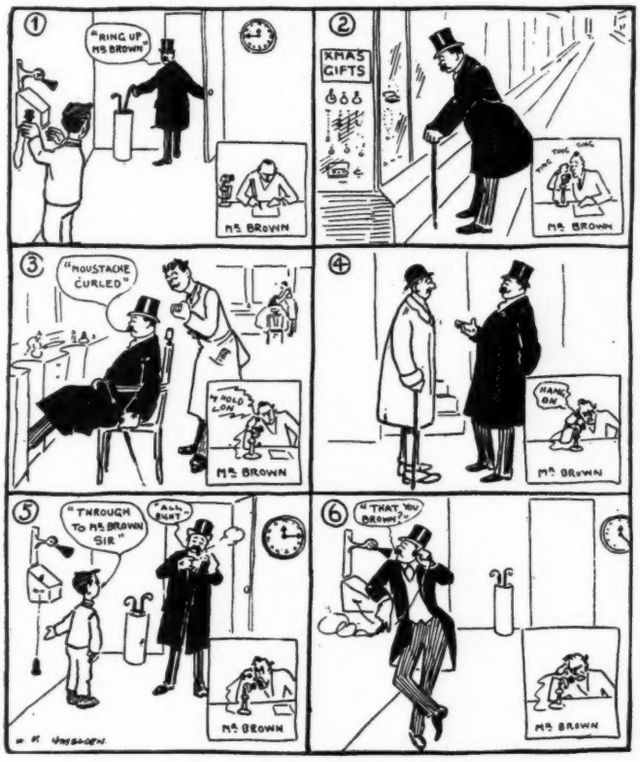
In answer to the question of whether any corporation had sole control the answer was that the American Telephone and Telegraph Company of Boston has had control since February 27, 1904. In answer to the question as to whether the individual stockholders had the power to control a single officer or director as to his appointment, the answer was that they had not been able to so far. The officials certify to an increase during the year 1908 on their combined assets of $735,035.65; increase total construction, $489,771.65; increase on real estate, $215,073.26. The increase in toll revenues in 1908 over 1907 is given in the statement as $128,932.49; in exchange revenue, $557,856.42. Total revenue from all sources, $1,213,968.44.

The eight largest items of construction work during the year is given as follows: 1. Reconstruction and extension of Oklahoma City exchange, not quite completed, $175,000. 2. Hugo exchange, reconstruction and additional equipment, cable, etc., $19,352.28. 3. Reconstruction of Guthrie exchange, new central office additional equipment, cable, etc., completed July 25, $45,539.87. 4. Extension and reconstruction of Tulsa exchange, cable work, etc., $18,800.11. 5. Rebuilding Chickasha exchange, improvements, $32,298.85. 6. Extension of Musko-

gee exchange, additional cable facilities, $23,563.97. 7. Repairing of toll line between Hugo and Durant, $13,849.77. 8. Additional equipment between Oklahoma City and Davis.

English Telephone Manners.

The accompanying cartoon was published in the London, Eng., *Daily Mirror* in connection with the recent instructions issued by the Postmaster-General to telephone operators in his employ, to be polite to subscribers. The *Daily Mirror* coments as follows: "We should esteem it a favor if he would also teach manners to the subscribers themselves. Many telephone users are not only rude to the tele-



An English Cartoon on Telephone Manners.

phone employees, but inconsiderate to those whom they call up, often keeping people waiting many minutes while they find themselves. There is too much of the 'hold-the-line-he'll-be-here-in-a-minute' nuisance."

The above would also apply to many persons in this country, especially in our larger cities.

Anti-Consolidation Sentiment in Norfolk, Va.

Another telephone subscriber in Norfolk, Va., has sent to the editors of the *Virginian-Pilot* a strongly worded protest against the consolidation of the competing telephone systems, which has been proposed by the Bell company. Mr. Paul Garrett, a well known business man, has written a letter of which we reprint the essential and significant parts as follows:

"The prime consideration with the patrons of the telephone company, is good service. Telephone service is no longer a matter of convenience, but a necessity to business and social life; and opposition to consolidation is based largely, I believe, on the fear, unfortunately too well founded, that without competition the service will deteriorate.

"By service I mean the efficiency of the operators, for except in cases of interference from storms there is no longer any excuse for poor mechanical appliances. Not only is there fear that without competition the standard of efficiency of operators might be lowered, but with two systems, one has, at least, the option of using that system which gives the most efficient service.

"While theoretically the proposition of consolidation is good (undoubtedly so for the telephone company), yet my observation of the service given in those cities where there is no competition does not bear out the correctness of this theory as to the patrons, and I am convinced that in practical experience even a poor service from two companies will give better general satisfaction than a good service from one company.

"To illustrate: With only one company giving service, granting that there are two lines to each business office, any damage from storms or natural causes affecting one of these lines would, in the majority of these cases, affect both, and the subscribers to the service would be very much inconvenienced if it required, as has frequently been the case in our experience, anywhere from three to ten days to reinstate a service crippled by storms. I recall many instances in which it has taken a week to repair damage to the line; I recall very few in which after a general disturbance of the line, our service has been reinstated within three days, and I recall more than one instance in which the service was not reinstated for ten days and then only after we had made it known to the company that we would not only deduct for the time the telephones were out of commission, but would insist on collecting damages if our line was not put into service. Without the use of the lines of another system, our business would have suffered a very material loss.

"Another point to be considered is the fact that it will be necessary for most of the business houses who do any considerable amount of local work to have at least two lines from one company to prevent the annoyance which invariably arises at being told repeatedly that the single line is 'busy.' As an instance, I today made three calls, given during the space of twenty minutes, for a party who has only one telephone, and was told each time that the line was 'busy'. The manager of the company insists that 'central' is never mistaken in making this statement. Now where there is competition for business it might very frequently happen that a customer, wanting to place an order, and tired out at finding one line repeatedly busy, would in desperation call up another house in the same line of business and place the order, so that few business houses of any moment could afford to run the risk of having only one line into their office.

"As to the proposition that the telephone company needs to have its franchise amended in order to float its bonds and secure money for improving its equipment, such a proposition is ridiculous, and is a slur on the intelligence of the community. The inconvenience and material loss to the business community alone, by having any suspension of the telephone service is an all-sufficient guarantee against the interference with the operation of its franchise unless provoked beyond endurance by an altogether bad and inefficient service to its patrons. Nor need the telephone company ever be afraid to take the business public into its confidence on the question of increased rates in Norfolk; for let it once show the business men of the city that under good management its rates are not productive of fair revenue, the merchants themselves would demand such rates as would enable the telephone company to give a service not less efficient than the best possible to be had. The community has more grounds for demanding some guarantee of good service than the company for demanding perpetual franchise.

"As to an appeal to the Corporation Commission the telephone company has all the best of any such proposition; for if it should develop that the telephone company's charges are not such as to yield it a fair return on its investment, and maintain its plant and equipment in good order, it can

at once appeal to the Corporation Commission for the privilege of amending the scale of charges; while if the public is given a poor service it is practically without any recourse whatever. Competition is not only the life of trade, but the surest guarantee of at least a fairly good service, and this is peculiarly true of all public service corporations.

"Is the present consolidation of the street railway and power and lighting service of Norfolk sufficiently satisfactory to point to it with pride as an example of the unmistakable benefits of consolidation?

"Respectfully,

(Signed) "Paul Garrett."

Louisville Board of Trade Rebukes Board of Trade for "Whitewash" Telephone Report.

On Dec. 30 resolutions disapproving the action of its directors in issuing a report commenting favorably on the rates charged by the Cumberland Telephone & Telegraph Company (Bell), and ordering that the Cumberland company be notified to quit using its names in defense of telephone rates, were adopted by the Board of Trade in special session. Another resolution advising the mayor and general council that the Board of Trade has never sanctioned the advances in rates made by the Cumberland company, asserting that the Cumberland company should receive a fair return on its capital, and pledging the Board of Trade to give to the city government its aid and support in the telephone controversy, also was adopted. These resolutions were the culmination of a two-hour meeting of the Board of Trade in which strong allegations against the methods of the Cumberland Telephone & Telegraph Company in making reports of its business condition, were made by C. M. Bullitt, who requested that the meeting be called. He took the position that the directors of the board cannot themselves bind the Board of Trade in any question of policy, and that therefore the statement the Cumberland company has made to the effect that its increase in rates has the sanction of the Board of Trade, is incorrect. Motions were made with the purpose of avoiding any censure of the directors of the Board of Trade for their action in approving the rates of the telephone company, but these failed. It was agreed that the directors only could act as individuals and privately in either approving any action of the telephone company, or condemning such action. The action that was disapproved today by the Board of Trade, was the acceptance of a report exonerating the Cumberland company of unfair increases in rates by the directors, who seemed to act under the impression that they bound the Board of Trade. The Cumberland so accepted the action of the directors and published statements quoting the Board of Trade as approving its rates.

Leading Chicago Paper Favors Independent Connection.

The following is from an editorial in the *Daily News*, Chicago's leading afternoon and evening paper:

"Within a radius of 500 miles of Chicago there are nearly 2,000,000 users of so-called Independent telephones. They would like to have connection with Chicago, but only users of Bell telephones now can talk with persons in this city. Obviously it would be in the interest of Chicago business men to extend the long distance service as widely as possible. Orders of goods frequently are placed through the telephone. Since users of Independent telephones cannot talk with Chicago houses many are tempted to place their orders with firms in other cities which give connections with Independent telephone systems. The Chicago Telephone Company, which is controlled by the American Telephone and Telegraph Company, the parent Bell corporation, refuses to give connections to the Independents. The latter do not favor establishing relations with the Bell concern. Each party to the telephone feud asserts that the other would not co-operate to give satisfactory service. Sooner or later, it would seem, all the telephone exchanges of the country must be combined under one management. But since the present rivalry exists Chicago is confronted with the problem of providing connections with the Independent telephones in the territory surrounding it. The suggestion has been made that the Illinois Tunnel Company's plant be utilized to provide business connections with the Independents. The council committee on gas, oil and electric light, a bare majority of which favors the immediate granting permission to the Illinois Tunnel Company to sell its telephone privileges to the Chicago Telephone Company, does not seem to have given the subject of Independent telephone connections for business men as much consideration as its importance merits.

Merger Plans Given Up at Norfolk, Va.

After a long drawn out campaign to promote a merger with its competitor, the Southern States Telephone Company, at Norfolk, Va., the Southern Bell Telephone Company has given up its project. The Southern States company will probably ask permission to raise its rates.

At the meeting of the Industrial Commission and the Ordinance Committee of the City Council, when the Southern Bell withdrew its petition to merge with the Independent company, Harvey M. Dickson, president of the commission, was asked to select an accountant to go over the books of the States company. This accountant will report the result of his work to the commission and by this method the States company intends to prove that it is operating at no profit. In view of this fact the commission and the ordinance committee will then be asked to recommend for approval by the council an ordinance providing for the proposed increased rates.

Mr. Dickson said that if it is proven that this public service-corporation is being operated at no profit, he will recommend that it be given permission to raise the present rates.

Even though the Southern Bell, through its vice-president, W. T. Gentry, has withdrawn its application for the merger, the ordinance committee and the commission will make a full report of the matter to the council.

Mr. Dickson said that the final report of the commission will be an unanimous vote against the merger with amended franchise as proposed by the Southern Bell, before the presentation of the letter of withdrawal.

Michigan Independent Company Refuses to Connect with the Bell.

The North Onondaga and Eaton Rapids Telephone Company held its annual meeting at Eaton Rapids, Mich., on January 2, and the following officers were elected: President, D. Beasore; vice-president, Claude Chamberlain; secretary, Francis Van Buskirk; treasurer, Mr. Barret.

This company, in the early part of December, had its switchboard put out of commission by an electric light wire falling across its lead, causing considerable damage in the central office. The Michigan State Telephone Company (Bell), through its local manager, offered the use of its board temporarily without cost. After the lines were connected to the Bell company's board a proposition was made to switch for the North Onondaga company at $3.00 per year.

The North Onondaga & Eaton Rapids Telephone Company have about 120 subscribers on its board while the Michigan State Telephone Company has an exchange of about 400 subscribers. For this reason quite a number of the stock holders in the company favored the idea of remaining with

the Michigan State Telephone Company. At the annual meeting this matter was thoroughly discussed and a short talk on the subject was given by the Secretary of the State Independent Association so that when the matter was put to vote thirty-one stockholders voted to repair the board and remove the lines from the Bell office and operate an entirely Independent telephone company. But two stockholders voted for the Bell connection, thus making another decided victory for the Independents.

New Independent Company in Omaha Files Rates.

A new schedule of rates filed by the Independent Telephone Company, of Omaha, Neb., with the State Railroad Commission. There are two sets of rates, one the regular rate with discounts of 50 cents on business telephones and 25 cents on residence telephones when bills are paid by the 10th of the month. The schedule provides for the increase in the number of subscribers which will come during the year, and indicates that the company is preparing to more than double its service during the year. The new rates follow:

For business service—

	Per Month.	Net.
For less than 6,000 subscribers	$2.50	$2.00
From 6,000 to 7,000 subscribers	3.00	2.50
From 7,000 to 10,000 subscribers	4.00	3.50
For 10,000 subscribers		4.50

Residence rates—

	Per Month.	Net.
For less than 6,000 subscribers	$1.25	$1.00
From 6,000 to 7,000 subscribers	1.50	1.25
From 7,000 to 10,000 subscribers	1.75	1.50
For 10,000 subscribers		2.00

The low rates of $2.50, or $2 net, for business telephones and $1.25, or $1 net, for residence telephones, are those which will be in effect from the beginning.

The rates of the Bell company at the present time are $7 a month for business telephones and $4 a month for residence telephones, with a discount to $3 a month net for immediate payment. The Bell company, it is said, proposes to make its residence rates, $3.50 a month with a 50-cent discount, leaving the net rate the same as heretofore.

The Independent company has been giving free service for a month while introducing its service, giving the subscriber the privilege of retaining the telephone or ordering it out, if he chose. This was objected to by the Bell company, which secured an order from the railway commission recently ordering the Independent people to make their charges from the date when service commenced.

Competition in Omaha is likely to be a lively issue during the coming twelve months, and the Independent people expect to make rapid gains. They have an advantage in the support of a number of well developed exchanges in Nebraska and Iowa, and a comprehensive long distance system.

Independents Active in Montana.

The Montana Independent Telephone Company is gradually extending its lines and is opening new exchanges. The exchange at Anaconda has been formally opened and starts with a good list of subscribers. The toll line between Butte and Anaconda gives exceptionally good service and does a great amount of business.

Following out its broad policy of expansion, the Independent company has begun work in the city of Helena on an underground system of conduit in the heart of the city laying 30,000 feet of fibre ducts encased in cement. It is expected to have the work completed early in January. Plans have been decided on for the erection of a fire proof exchange building at Park and Edwards Streets, and the automatic telephone service will be installed. It is probable that the service will be ready in the latter part of January or early in February.

The Independent Company is now extending its toll line from Butte to Helena and eastern points in the State. The construction of the line between Butte and Helena requires more than 300 miles of heavy copper wire, beside many thousand cross-arms and several carloads of other material. With the toll line completed to Logan, which is now being rapidly constructed, the Independents will soon have connection between Butte, Anaconda, Helena, Bozeman, Livingston, Billings, Deer Lodge, Lewistown and many smaller towns. In the construction of the toll line to Logan, 15 car loads of poles and two car loads of copper wire are required.

Early in 1909, exchanges will be opened in Helena, Great Falls, Deer Lodge, Missoula and several smaller towns, so that by summer, the Independents will have the entire state of Montana pretty well covered.

During the past few months the company has been adding to its service in Butte at the rate of nearly 50 new telephones every week. The company now furnishes fully four-fifths of the telephone service in Butte.

South Bend Home Company Announces Plans for $30,000 Expenditure on Improvements.

Theodore Thorward, president of the South Bend Home Telephone Company, celebrated the completion of the new copper circuit from South Bend to Warsaw, giving the Home Telephone Company direct toll line connection with Ft. Wayne and other eastern points, by an important announcement. This is to the effect that plans already made for new construction in 1909 call for an expenditure of at least $30,000. Extensive additions to the underground plant will be made at South Bend, specific announcements having been made of jobs totaling about 30,000 duct-ft. of conduit, and 16,000 ft. of 300-pr. cable, to say nothing of all the smaller material required to complete this addition.

During the past year the Home company has made many improvements at South Bend, Mishawaka, River Park, New Carlisle, and other exchanges, and is rapidly forging ahead, having the support of practically all the telephone users in its territory.

New Association in Southern Minnesota.

The first annual meeting of the Southwestern Minnesota Telephone Association was recently held at Heron Lake, Minn. The different local organizations were represented as follows: F. D. Lindquist and J. F. Leapold, Fulda Telephone Company; Mr. Woodgate, the Slayton company; A. L. Wells, the Brewster company; Mr. Smallwood and Mr. Cashel, the Worthington company; M. M. Cadwell and Matt Miller, the Windom Mutual company; J. N. Putman and A. M. St. John, the Lakefield company. The companies already members are: The Brewster-Round Lake Telephone Company; the Woodgate Telephone System; the Fulda Telephone Company; the Windom Mutual Telephone Company; the Lakefield Telephone Company. The advantages of membership are such that other Independent companies in the locality are likely to join soon. The companies now in the organization cover four counties and have about 200 miles of toll lines and 3,500 subscribers. Their property is worth, altogether, something like $200,000.

The organization was perfected by the election of the following named gentlemen as officers for the ensuing year: A. L. Wells, president, Brewster; George H. Woodgate, vice-president, Slayton; F. D. Lindquist, secretary and treasurer, Fulda; directors, M. N. Cadwell, Windom and E. A. Gage, Lakefield.

Independent Victory at Duncombe, Iowa.

It is reported that through the influence of Mr. E. H. Martin, of Webster City, Iowa, the Bell Telephone Company has lost its last remaining station at Duncombe, a small town near Webster City. People in Duncombe now give all their long distance business to the Independents.

What a Southern Editor Thinks of Telephone Mergers.

In Norfolk, Va., the effort of the Southern Bell Telephone & Telegraph Company to promote a merger with its competitor and increase rates called forth a newspaper editorial article from which is abstracted the following:

"It seems to us that in the consideration of this subject there has been a confusion of the matter, and a failure to look at the proposition from the side of the Southern States Telephone Company. In the franchise of this company two features stand out prominently: first, the rates are fixed at a lower cost than those of the Bell company, and are said to be so low that the company cannot make money.

"Second, it is specifically provided that the Southern States company shall not sell out to the Bell company, and that when at any time it ceases to be an Independent company, in competition with the Bell company, that it shall forfeit its franchise to the city.

"We regret to see any enterprise here fail to make money, but if it does fail why should the city intervene and sacrifice its guarded rights over the Bell company and allow an increased telephone charge by the Bell that would enable it to buy out the Southern States?

"The city would be making enough sacrifice to let the Southern States sell to the Bell at all, and cease to be an Independent company, and in competition with the Bell. What was the sense in putting those provisions in the original Southern States franchise if at the first request they are to be ignored?

"Why not simply amend the Southern States franchise so as to allow it to charge the same as the Bell, and then let the competition continue, or really begin, and the best service get the business?

"It would be the height of folly to repeal the clause in the Bell franchise for the regulation by the city of that company's service and charges in Norfolk, and the real question comes as to whether the city should allow the Southern States to sell to it at any price, much less that the city should practically buy the Southern States and give it to the Bell, and then throw away every safeguard that is now saved to the people by a wise provision in the franchise.

"In the report of the meeting of Saturday night we find the following:

"'Mr. Gentry said that the Southern Bell company would not feel justified in making the purchase of the Southern States company and going to the additional expense incident to the merger unless the clause in the franchise which delegates the right to amend, alter or repeal to the city is stricken out and that the company is given a franchise to run for twenty-nine years.'"

"Indeed! Well, who asked the Bell to purchase the Southern States and go to the additional expense of the merger? What throngs of people have flocked to the Councils and besought them to allow this merger, and for the precious privilege of paying $100,000 a year more for the one telephone, and to repeal the only clause under which the city can demand good service and reasonable rates?

"We have not observed the rush, and we think it would be cruel to insist upon making the Bell do anything of the kind against its will. It should be remembered that the Bell is in the combination of only $800,000,000 capital and should be dealt with very tenderly."

It looks as if the merger promoters had struck a live wire here!

Missouri Telephone Men Meet in Sixth District. Good Meeting in First Missouri District.

The quarterly meeting of the Sixth District Missouri Independent Telephone Association was held at Sedalia, Mo., December 17th. A very interesting program was carried out.

The Sedalia Home Telephone Company extended an invitation to all in attendance to visit its new exchange, recently completed, and the members were much pleased with the new plant.

Louisville Councilman Believes in Telephone Competition.

The Louisville, Ky., *Times* says in its issue of December 24, 1908:

"Isadore Forst, former president of the council, has returned from a business trip to Denver, Col., and was in the city hall today. Mr. Forst says he saw at Denver something of the operations of a single telephone company, where the Bell company has a monopoly of the business. He says merchants are forced to pay $15 a month for service, although they have a contract for $2.50 and $3 per month for sixty calls. All calls over sixty are charged for, and the result is that merchants are imposed upon. Mr. Forst believes that if there was but one telephone company in Louisville the city would be imposed upon."

Indexes for Volume 16 of Telephone May Be Obtained by Writing to the Publishers.

Complete indexes of Volume No. 16 of TELEPHONY, including the monthly issues of TELEPHONY and the weekly issues of the American Telephone Journal, from the 1st of July, up to the time of the merger of the papers and for the weekly TELEPHONY from that time on, are ready for distribution.

These form valuable reference lists for those who have kept their copies, whether they wish to have them bound or not. A limited number of sets have been kept and will be forwarded upon receipt of requests from subscribers, without charge.

A limited number of bound volumes of American Telephone Journals covering the past three years, are also to be sold.

Minnesota Independents Plan for State Association.

A state association with the ultimate object of putting the Independent telephone business upon a firmer basis will be formed as the result of a meeting of managers of telephone companies in Minnesota cities, held at Minneapolis on Dec. 15.

Over 50 managers met and discussed the possibility of an equitable rate for long distance telephone service in the state.

Among those present were W. S. Clay, Hutchinson; George Ocobock, Norwood; Edward Kelly, Cottonwood; E. N. Schmitz, Stewart, and E. R. Rassmussen, Willmar.

Improvement Project for Independent Plant at Huntington, W. Va.

According to a statement made by Dan A. Mossman, president of the Huntington Mutual Telephone Company, that corporation will, within the next year, expend a sum approximating $150,000, in improvements planned for the local system. These improvements will include an underground system for the business section of the city, and the installation of new central office equipment in a new exchange building, which will be erected at a cost of probably $30,000. The building will be of fireproof construction.

Great Northern Railroad Company Installs Independent Telephones at Superior, Wis.

As a result of the issuance of an order by the Wisconsin Railroad Commission compelling the Great Northern Railroad Company to install the instruments of the People's Telephone Company (Independent) at Superior, the telephones were put in on December 8. One was placed in the city ticket office, and the other in the general freight office, so that telephone subscribers to both Bell and Independent systems will now have equal facilities for doing business with the railroad.

Telephone Patents

Conducted by Max W. Zabel

REPAIRING AND TESTING MEANS FOR CONTACT-LESS THERMAL PROTECTORS.

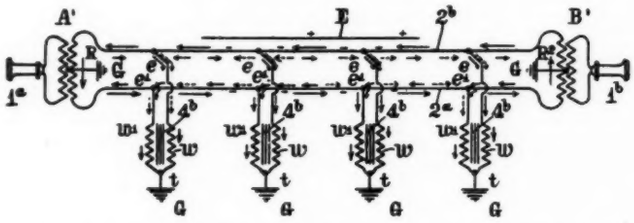
Frank B. Cook, Chicago, Ill., patent 906,615, December 15, 1908.

A repairing device for restoring blown heat coils to normal condition is shown in this patent. It consists of a plurality of springs and levers which are mounted upon an insulated strip, and can be attached to the protector springs similar to the ordinary testing springs of protector racks. The springs are associated with a battery and a meter, and when any heat coil is blown, the device is attached to the springs of the open circuit, causing the battery to flow through the heat coil and restoring the springs of the heat coil to normal position. The current in the heat coil serves to melt the solder and permit of the restoration of the circuit-closing springs, after which the battery current is turned off automatically, and the device removed.

METHOD OF AND APPARATUS FOR RELIEVING WIRE CIRCUITS OF ELECTROSTATIC REACTION CURRENTS.

N. G. Warth, Columbus, O., patent 903,923, Nov. 17, 1908.

This invention is designed to overcome the effects of electrostatic reaction currents in telephone cable circuits.



and is set forth as being an improvement over the Pupin system of "loading" coils. The invention, as shown in the illustration, consists of coils w and w^1, which are of high impedance relative to the voice currents, which are transmitted over the line wires 2*a* and 2*b*. The coils are non-inductive to the oscillating electrostatic reaction currents, which flow through the windings in parallel from the lines to the ground. In this latter case the ohmic resistance is divided, and as the currents flow differentially above the coils, new currents are created. Thus, the coils offer a minimum resistance to the flow of the oscillating capacity currents, but offer a high impedance to the flow of the voice currents to the ground.

The invention also consists, not only in the application of such type of coils to the circuit and in connecting them between the circuit and the earth, but in the particular distribution or application of the coils to the circuit through its length, and in the adjustment of the spacing distance between the coils to various types of circuits.

TELEPHONE HOOD.

H. L. Burrus, Hornell, N. Y., patent 908,444, Jan. 5, 1909.

This invention provides a hood, open at the bottom, inside of which are mounted a receiver and transmitter. The hood is to be mounted on the wall or on the back of a chair, and persons using the telephone place the hood over the head to exclude extraneous noises.

TELEPHONE ATTACHMENT.

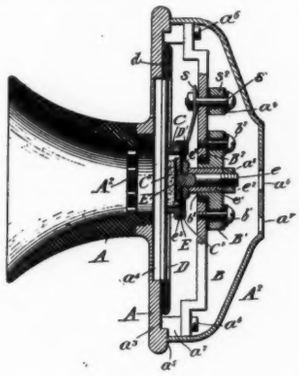
G. J. Boelen, The Hague, Netherlands, patent 907,960, Dec. 29, 1908.

This patent describes an attachment for a telephone substation, consisting of a phonographic device which is set ready to deliver a message, and which can be connected through the signal circuit of the telephone sub-station with the transmitter, thus transmitting the message over the telephone circuit.

TELEPHONE TRANSMITTER.

W. W. Dean, Elyria, O., patent 907,975, Dec. 29, 1908.

The telephone transmitter covered by this patent consists of the diaphragm *D*, which rests directly against the



carbon-carrying cup *E*, in which is the comminuted material. The auxiliary diaphragm *D'* is to the rear of the carbon-carrying cup and is held in the bridge *B*. The spring *S* presses the carbon-carrying cup against the diaphragm. The carbon electrode *E*, is in the rear of the carbon-carrying cup.

TELEPHONE SYSTEM.

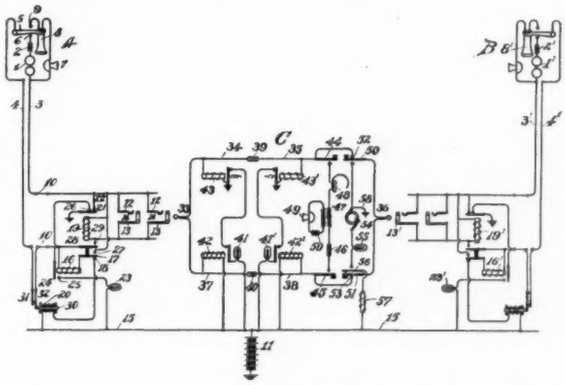
W. W. Dean, Chicago, Ill., patent 908,213, Dec. 29, 1908.

A four-party line telephone circuit is covered by this patent, and consists in the use of positive and negative ringing bells and the installation in each bell, of a suitable electrolytic cell or cells whose voltage is sufficient to stop the flow of the common battery current through the bells, but which is not sufficient to overcome the ringing current.

TELEPHONE SYSTEM.

Harry G. Webster, Chicago, Ill., patent 907,661, Dec. 22, 1908.

In this patent it is designed to cover a central energy telephone system, using four clearing out relays in the cord circuit, and using both a line and cut-off relay, the cut-off relay being of a very high resistance, in connection with a high resistance

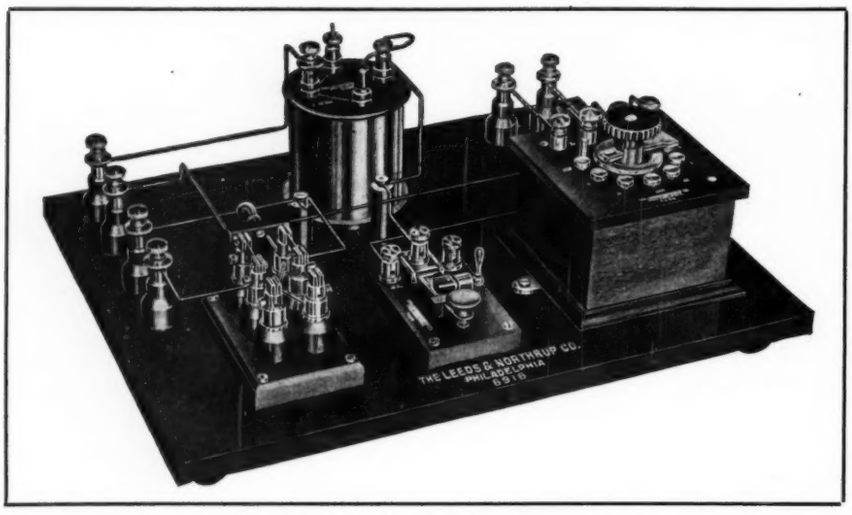


heat coil 20, which is normally included in series with the relay 16, but is disconnected therefrom when the cord circuit is in operation. The advantage claimed is that a high resistance relay can be used in connection with a very high resistance heat coil.

In the Manufacturing Field

Factory Cable Testing Apparatus.

The greater the experience of a manufacturer in insulation testing, the more will be the stress which he lays on the complete insulation of all parts of the equipment with which his product is measured. The touch of a damp hand at some critical point, a film of moisture on a hard rubber surface, or a transient ground on a nearby lighting circuit, may introduce costly errors in the readings of the apparatus



Special Insulation Testing Apparatus.

by which the quality and standing of his product is gauged.

In maintenance tests, which must necessarily be performed in the field, portability is an absolute necessity in the testing apparatus, and, to a certain degree, the insulation of the various parts of that apparatus from each other and from ground must be sacrificed to secure this primal requisite. In factory measurements, where the testing apparatus is permanently located, it is most distinctly advisable that no precaution be neglected which may guard against the effect of transient grounds, so dangerous because so intangible. It is best to mount the individual instruments of such a set so as to secure for them ample insulation, and then to make their connections entirely visible, and open to frequent inspection. This is best accomplished by running heavy copper wires through the air, making direct connections between the instruments.

The Leeds & Northrup Company, of Philadelphia, Pa., which has had extensive experience in designing this class of apparatus, is making up to order, testing outfits comprising a high sensibility galvanometer, Ayrton shunt, a tenth megohm resistance, a standard condenser, and the necessary switches and keys. These are mounted, as shown in the illustration, on a highly polished base of hard rubber, which is supported on rubber insulators. All connections are polished nickel plate, and contribute to the handsome appearance of the set.

The Blackburn Specialty Company, of Cleveland, O., reports that its sales for the last two months of 1908 have equalled those of the entire year of 1907—only another sign of returning prosperity. A good thing if properly advertised.

Mr. L. G. LeBourvean, formerly sales manager of the Central Telephone and Electric Company, of St. Louis, has been associated with the American Electric Telephone Company of Chicago as sales manager, since the first of the year.

The Chicago Electrical Show.

If the fourth annual exposition of the Chicago Electrical Trades Exposition Company, which opens at the Coliseum, Saturday afternoon, January 16, is not the most successful electrical show ever held in America it will be a great disappointment to the management which has assembled exhibits during the last year. There, however, is no question as to the success of the show as a trade proposition—every available square foot of space has been taken and the list of exhibitors is the most representative of all the shows this company has so successfully exploited. One feature wherein this year's Show will differ from former ones is in the fact that many of the displays will be working exhibits, many of them industrial in character.

One particularly important exhibit, in which the management takes no little pride in the announcement, is that of the United States Government which will occupy the entire Coliseum Annex with a display of electrical machinery and apparatus such as is used in the equipment of one of the $7,000,000 modern battleships. Six hundred thousand dollars of this amount is spent with electrical manufacturers.

The scheme of decoration for this year's Show is to be fully as elaborate and costly as that of last year. The same booths will be employed but the roof interior will be completely changed and particularly unique in its plan and design. The illumination will consist of 10,000 Tungsten lamps in arches over the aisles from booth to booth.

This year's Show will run 13 days—opening Saturday, Jan. 16, at 1 o'clock and running from 10 a. m. to 11 p. m. every week day until January 30.

Tuesday and Wednesday, January 26 and 27, have been set aside as special days for telephone men to attend the Show and appropriate souvenirs will be distributed.

Recent Ericsson Orders.

The L. M. Ericsson Telephone Manufacturing Company, of Buffalo, N. Y., reports the following recent sales of switchboards:

One section type "B" equipped with 160 standard indicator jacks and 40 No. 6 automatic drops and automatic self-restoring clearing out drops for the Lehigh Telephone Company, Lehigh, Nebraska.

Two sections type "B" equipped with 350 standard indicator jacks, 20 farmers' lines, and automatic self-restoring clearing out drops for the Hays Telephone Company, Hays, Kansas.

One section type "D" equipped with No. 6 automatic drops, for the Chapell Hill Telephone Company, Chapell Hill, Texas.

One section type "D" equipped with No. 6 automatic drops, for the Dalhart Telephone Company, Dalhart, Texas.

The American Conduit Company, New York, Chicago and Los Angeles, has issued, in Bulletin No. 226, a table showing the cost of the cement in mortar with different proportions of sand and cement, for different prices of cement.

Flameproof Jumper Wire.

Something new in the way of a jumper of cross-connecting wire, suitable for magneto, common battery or automatic exchanges has recently been placed on the market.

It is claimed that it has all the good points of the usual rubber covered flameproof wire at about only one half the cost and that it has many advantages over paraffined annunciator and switchboard wire, or beeswaxed silk and cotton jumper wire at about the same cost.

It consists of a copper conductor, tinned for ready soldering, covered with a wrapping of silk and a tight braid of cotton treated with a flameproof compound.

In the case of a telephone company operating in a territory where there are electric light or power circuits, it is a menace to the exchange to use any beeswaxed or paraffined wire on the distributing frames. Should the telephone lines become crossed with any of the foreign power circuits and the current brought into the distributing board, the mass of waxed jumper wires would make a hot fire. For this reason, a flameproof wire only should be used.

Flameproof Junior jumper wire as it is known, having no rubber insulation is quite small in diameter, and, therefore, may be easily threaded through the holes in the fanning strips of the distributing frames and, as the braid is very tight, it will not slip back when poked through these holes. The outer covering being a tight braid rather than a wrap, it is said the ends will not fray out when the wire is "skinned" and a neat job can be made in soldering, as the insulation will fit up snugly to the clips.

Flameproof Junior jumper wire, as it is known, having no by Alfred F. Moore, 200 North Third street, Philadelphia, Pa. It can also be obtained through Mr. R. S. Mueller, 414 Prospect street, S. E., Cleveland, Ohio.

For main distributing frames, flameproof Junior jumper wire is made up regularly and carried in stock in No. 22 B. & S. gage, duplex, one conductor red and the other white; for intermediate distributing frames, triplex, No. 22 gage, the three conductors being red, white and light blue, respectively. Both the duplex and triplex comes on spools carrying an even 1,000 ft.

The Swedish-American Company's Business Increasing.

The Swedish-American Telephone Company will be one of the principal telephone exhibitors at the Electrical Show, held at the Coliseum, Chicago, Jan. 16 to 30. The Swedish-American Company anticipates a large attendance of telephone men, and is preparing to take care of its friends and customers in a first class manner. Visitors to the Show will be interested in the complete display of up-to-date telephone apparatus that will be shown by the company.

The officers of the company state that the demand for apparatus of its manufacture is steadily increasing.

Among the companies contracting recently for central office equipment are the following: Illinois Western Telephone Company, Macomb, Ill., 150 line switchboard; Aurora County Telephone Company, Hamilton, Neb., 2 100-line switchboards; Gallup Telephone Company, Gallup, N. M., 100 line switchboard; Northern Illinois Telephone Company, Sandwich, Ill., 3 300-line switchboards; Foosland Telephone Company, Foosland, Ill., 1 100-line switchboard; Landessville Telephone Company, Landess, Ind., 1 100-line switchboard; Mt. Summit Telephone Company, Mt. Summit, Ind., 1 100-line switchboard; Geo. B. Foss, Etna, N. H., 1 100-line switchboard; Conway Telephone Company, Conway, S. C., 1 100-line switchboard; Wayne County Telephone Company, Wooster, Ohio, 1 200-line switchboard; Ancester Telephone Company, Ancester, Ont., Can., 3 100-line switchboards; Dunboyne Telephone Company, Dunboyne, Ont., Can., 1 100-line switchboard.

The company has also been enjoying the patronage of many municipalities in Manitoba, Can. The following have contracted for the Swedish-American equipment, their orders ranging from one to three hundred telephones, and from one to three switchboards: Municipality of Brenda, Municipality of Miniota, Municipality of Turtle Mountain, Municipality of Argyle, Municipality of Morton, Municipality of Woodworth, and numerous other Canadian operating companies.

The American Electric Fuse Company, Muskegon, Mich., puts forth some interesting claims for its "American Black Enameled Wire." The company states that the enamel insulation is a closely adhesive film of great toughness and tenacity which stretches with the wire, and will withstand all the handling incidental to winding. Among the special advantages of enamel insulation are that it is non-hygroscopic, and does not absorb moisture.

This form of insulation will readily withstand a temperature of 600 degrees Fahrenheit, without charring, burning or materially injuring the coil, and it dissipates heat rapidly.

The manufacturers claim that the enameled covering of the wire will not unite with chemicals which will not destroy the wire itself. Diluted acids and alkalies have little or no effect upon it, and it is insoluble in such solvents as alcohol, benzine, turpentine, petroleum, etc.

The thinness of insulation which is a feature of the enamel covering, results in notable efficiency and economy, as can be ascertained by working out a few winding problems.

The American Electric Fuse Company makes its enameled wire on machines of special design, which run twenty-four hours a day to insure a perfect wire, uniform in quality and thickness of insulation.

To keep quality and uniformity of the product up to the company's standard, the bare wire is chemically and electrically tested before being covered, to ascertain whether it is uniformly annealed and well drawn. The manufacturer states that besides being made of high grade copper wire, the American enameled wire is given an additional inspection test by rewinding every inch of insulated wire on another spool, and is then given a final general and electrical test, after which it is weighed and marked ready for shipment.

The American Conduit Company, 140 Nassau Street, New York, is mailing to customers an interesting postal card showing methods of hauling bituminized fiber conduit to the trench in Belgium. This brings out incidentally, in a very striking way, the ability of the bituminized fiber conduit, as packed for shipment, to withstand rough handling and repeated loading and unloading.

The Mason Cedar Company, of Grand Rapids, Minn., is well situated to give prompt delivery on poles. The company operates three yards at Grand Rapids, Blackberry and Bovey, respectively, and is thus enabled to quote especially low rates.

The Erner & Hopkins Company, of Columbus, Ohio, will move to a new six-story building on East Chestnut street, soon after the first of the year. For several years the company has occupied a four-story building on North Fourth street, but this space has been outgrown.

Mr. Walter S. Bissell, who for many years has been associated with the F. Bissell Company of Toledo, Ohio, as traveling salesman, on January 1 took up the duties of treasurer of the company. His many friends will be pleased to learn of his advancement and wish him much success in his new position.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

NEW COMPANIES.

AMITY, ARK.—The business men of Amity have organized a telephone company to be known as the Cedar Point and Amity Telephone Company, a charter for which will soon be asked for from the secretary of state. The stockholders are J. F. Sheets, A. L. and T. A. Hawkins, S. R. Harrison and M. L. C. Small.

RUPERT, IDAHO.—The Settlers' Mutual Telephone Company has been chartered with a capital stock of $48,000 by L. R. Adams, R. W. Adams and Chas. C. Nelson.

GUTTENBURG, IA.—The West Union Rural Telephone Company, with J. Shay, of McGregor; T. Morrison, of Decorah, and C. Curtz, of McGregor, as directors, has been formed to develop the farmer business in this vicinity.

WILTON JUNCTION, IA.—The Moscow-Wilton Rural Telephone Company has been incorporated by Harry H. Will, Moscow, with a capital of $500. Mr. Will will be secretary.

SCIENCE HILL, KY.—The Science Hill Telephone & Exchange Company has been chartered, with a capital stock of $800, by William Lowery, T. W. Denney, A. Y. Hayes and others.

BROWERVILLE, MINN.—The Ward and Moran Telephone Company has been organized to construct and operate a rural telephone line to Long Prairie. E. T. Crist is president and Frank Haverick, secretary.

OLGA, MINN.—The Olga Telephone Company has been incorporated with a capital stock of $10,000. Fosston will be made the headquarters.

ST. LOUIS, MO.—Articles of incorporation have been filed by the Vermilion Grove Telephone Company of Vermilion Grove, Ill., with a capital stock of $5,000. John M. Kendall, C. M. Hester and D. J. Pugh are the incorporators.

WEST PLAINS, MO.—The Globe Telephone Company is a new farmers' line that was organized recently with John G. W. Richardson as president and Asa Jarrett, secretary. A line will be built at once from the stockholders' homes to this city and connect with the local exchange.

CLEVELAND, OHIO.—The Polk Rural Telephone Company of Polk, Ashland county, has been incorporated with a capital stock of $8,000 by J. F. Smith, J. S. Kauffman and others.

GUTHRIE, OKLA.—The Coal Creek Telephone Company of Pawnee has been incorporated with a capital stock of $300. The incorporators are: W. J. Nail and J. M. McKill of Ralsten and John Wolfe of Pawnee.

HALFWAY, ORE.—Articles of incorporation have been filed for the Panhandle Co-operative Telephone Company of Pine Valley. The company will commence business with a capital of $4,500. Chas. B. Davis is president.

PENDLETON, ORE.—J. Hanscom, Hugh Bell and others have organized a telephone company which will construct a line from this city to Cold Springs. Work will be started on the construction of the line at once.

SHEFFIELD, PA.—The Sheffield Telephone Company, with a capital stock of $15,000, has been incorporated by Treasurer Archibald S. Day of Sheffield. The directors are: Wm. A. Alexander, Walter W. Beaty, Warren, Pa.; Frank D. Kinnear, Youngsville, Pa.

LEXINGTON, S. C.—The farmers of the Rockywell section have organized a telephone company with the following officers: Haskell Shull, president; Marshall Hook, vice-president; W. K. Hook, secretary; and G. A. Kaminer, treasurer.

HAYTI, S. D.—Warren Greene, A. H. Anderson, K. G. Knudtson, Edward Arzberger and P. O. Svarari have filed articles of incorporation for the Hamlin County Farmers' Telephone Company. The capital stock of the new company is $25,000.

VOLIN, S. D.—The Volin Telephone Company has been incorporated by Iver Bagstad, A. O. Bagstad, Ole Peteson, Edw. O. Leir and James F. Volin, with a capitalization of $25,000.

FARMINGTON, UTAH.—The Davis County Independent Telephone Company has been incorporated with a capital stock of $40,000, the stockholders being residents of Davis county. The directors are: Dr. S. Gleason, Dr. Kesler, Rufus Adams, Bishop Wood, Dr. O. C. Dixon, Joseph Ford, and J. S. White. A. L. Clark is treasurer and N. B. Stadley is secretary-manager. The general offices of the company will be located at Farmington.

MONTPELIER, VT.—The Blue Mountain Telephone Company of South Ryegate, has been incorporated with a capital of $30,000, to erect telephone lines in Groton, Ryegate, Newbury and Topsham. The incorporators are: M. F. Sargent, Albert Wright, A. T. Beaton, Carl Brown and others.

MONTPELIER, VT.—The Globe Mountain Telephone Company of West Townsend, has been incorporated to build a telephone line between West Townsend and Windham. G. T. Gale, L. F. Jenson and others of South Windham are stockholders.

BERLIN, WIS.—Articles of incorporation have been filed by the Berlin Telephone Company. The company is capitalized at $6,000 and the incorporators are: C. S. Morris, L. C. Peck and Charles L. Bryden.

FINANCIAL.

MONMOUTH, ILL.—The stockholders of the Monmouth Telephone Company have authorized the issue of $125,000 of bonds for the purpose of improving and enlarging its system in this city.

PITTSFIELD, ILL.—At the semi-annual meeting of the Pike County Telephone Company the regular 6 per cent dividend was declared.

VANDALIA, ILL.—The capital stock of the Vandalia Telephone Company has been increased from $15,000 to $50,000 and the principal office moved from Troy to Vandalia.

LAFAYETTE, IND.—The directors of the Lafayette Telephone Company have declared the customary quarterly dividend of 1½ per cent on the common and preferred stock.

FRANKFORT, KY.—The Grayson County Telephone Company has increased its capital stock from $2,500 to $5,000.

GRAND RAPIDS, MICH.—The forty-sixth regular dividend of 2 per cent was declared at the recent quarterly meeting of the Citizens' Telephone Company. It will be payable Jan. 20 and amounts to more than $60,000.

BRAYMER, MO.—At a recent meeting of the Braymer-Roads Telephone Company it was decided to increase the capital stock to $5,000.

BELLEVUE, OHIO.—The directors of the Local Telephone Company have declared a quarterly dividend of 1½ per cent.

CLEVELAND, OHIO.—The regular quarterly dividend of 1½ per cent on its preferred stock has been declared by Cuyahoga Telephone Company.

CLEVELAND, OHIO.—The United States Telephone Company has declared the regular quarterly dividend of 1½ per cent on its preferred stock, payable Feb. 13 to holders of record Jan. 30.

PIQUA, OHIO.—The directors of the Piqua Home Telephone Company have declared a semi-annual dividend of 2 per cent.

TOLEDO, OHIO.—The board of directors of the Toledo Home Telephone Company has declared the regular quarterly dividend of 1 per cent, and an extra dividend of one-half of 1 per cent upon the stock of the company, payable on Jan. 20 to stockholders of record at the close of business Dec. 31.

COLOMA, WIS.—The Coloma Telephone Company has filed an amendment to its charter increasing its capital stock from $3,000 to $4,000.

WAUPACA, WIS.—The Rural Telephone Company has increased its capital stock from $1,000 to $3,000.

FRANCHISES.

WYANDOTTE, MICH.—The Independent Telephone Company is rapidly adding to its long list of subscribers. The village council of Ford has granted permission to install the service there and the trustees of Ecorse township will probably grant permission for connections in a short time.

McINTOSH, MINN.—The Garden Valley Telephone Company has applied for a franchise in this city.

MEDORA, N. D.—The Northern Telephone Company and the Dakota Western Telephone Company have been granted franchises to maintain telephone systems in this county.

TULSA, OKLA.—The Citizens' Telephone Company, which is capitalized at $10,000, has applied to the city council for a franchise to operate a telephone system in this city. J. I. Gillispie is the promoter of the company.

MOUNT VERNON, WASH.—The Independent Telephone Company will probably be granted a franchise by the city council. The company has agreed to establish free telephone connections between this city, Conway, Fir, Sedro-Wooley and Burlington.

NORTH YAKIMA, WASH.—The Academy Telephone Company has applied to the city council for a franchise to construct a telephone line up to Ahtanum Valley.

NORTH YAKIMA, WASH.—A franchise to build and operate a telephone line in the East Selah and Pomona Heights and the Columbia River district is to be asked of the county commissioners by a new corporation known as the Northeast Telephone Company. The officers are W. A. Voliva, president; O. A. King, vice-president; and M. Simmons, secretary and treasurer.

PALOUSE, WASH.—The Inland Empire Telephone and Telegraph Company was recently granted a franchise to erect a line and transact business in this county.

WINLOCK, WASH.—A telephone franchise is being sought for by Oscar Foote, who also has applied for a franchise in Centralia. Mr. Foote contemplates spending about $8,000 in Winlock.

CUMBERLAND, WIS.—A franchise has been granted by the city council to the Farmers' Telephone Company to enter this city.

CONSTRUCTION.

PETTIGREW, ARK.—The Pettigrew Telephone Company has completed its line from Yale to Clarksville, connecting with the St. Paul line.

SAN DIEGO, CAL.—The San Diego Home Telephone Company has made plans for the building of two new exchanges to take care of its rapidly increasing business. A new exchange has just been established at Ahula Vista.

BROOKSVILLE, FLA.—The East Florida Telephone Company's extension from Istachatta to Brooksville has been completed and connection given to all points on the East Florida long distance system, and the Ocala Telephone Company's system.

CEDAR KEY, FLA.—The East Florida Telephone Company's line to Cedar Key has been completed.

HOMERVILLE, GA.—A company with H. J. Dame as manager contemplates the establishment of a local telephone system with long distance connections.

SANDPOINT, IDAHO.—Three new telephone lines will be constructed in the Pend d'Orielle country. The first from Sandpoint to Cocolalla; the second from Athol around the upper end of the lake to Lakeview, and the third from Bonner's Ferry to Summit, and then to Eastport.

GREEN VALLEY, ILL.—The Citizens' Telephone Company is planning to rebuild its system in this place.

BENNINGTON, IA.—The Big Rock Telephone Company has completed the extension to its line, adding twelve more patrons to its list of subscribers.

BOONE, IA.—The Boone County Telephone Company has completed another metallic circuit between Boone and Ogden.

PATON, IA.—The Hawkeye Telephone Company is planning to construct a line from this city to Perry.

TOLEDO, IA.—Extensive improvements will be made during the coming season by the Commercial Telephone Company. An underground cable is proposed.

BALDWIN, KAN.—The Baldwin Telephone Company is stringing 4,000 ft. of cable to replace its open wire leads.

BURTON, KAN.—The Independent Telephone Company will build a new line two miles north of town.

COLUMBUS, KAN.—The Cherokee County Mutual Telephone Company is installing an additional switchboard of 200 drops capacity.

GARDEN CITY, KAN.—Dr. L. H. Johnson of the Old Kentucky Home Ranch, north of here, has just installed a telephone system which connects every part of the property with the ranch headquarters.

GLASCOW, KAN.—The Glascow Telephone Company is repairing its telephone system.

RAGO, KAN.—The Almeda Telephone Company has completed its new line in this place.

TOPEKA, KAN.—Work has been commenced on the second of two toll lines which are being constructed by a company composed of representatives from the Independent telephone companies of the state. This line will run northeast through Holton, Horton, Hiawatha, Seneca, Sabeta, and Troy, points which in the past could not be reached from Topeka. Besides opening a new territory to the Independents, the line will give more direct connections between Topeka and Atchison, Leavenworth, St. Joseph, Omaha and Des Moines.

A force of men has been at work on the other line for some time. This line runs south from Abilene, through Herington, Hutchinson, Marion, Newton to Wichita, where it connects with the strong Independent system of that city.

It is said that both lines will be opened for traffic by the first of March if the weather conditions remain so that the workmen can continue their labors. In connection with these improvements three direct copper circuits are being run from Topeka to Kansas City and three from Topeka west to Abilene to take care of the extra business which the toll company expects to reap as soon as the lines now building are completed.

BANFIELD, MICH.—A hundred line switchboard is to be installed in the local exchange by the Citizens' Telephone Company.

BRONSON, MICH.—The Bronson Mutual Telephone Company is building a line from Bronson to Snow Prairie.

ST. CLAIR, MICH.—The St. Clair River Telephone Company will build a line from St. Clair to Recor's Point.

BOVEY, MINN.—An exchange is being installed in this place by the Mesaba Telephone Company.

CLARA CITY, MINN.—Work has been finished on the construction of the Central Wang telephone line.

EASTON, MINN.—Extensive improvements will be made by the Farmers' Telephone Company on its country lines.

EMILY, MINN.—Plans have been completed for a line to run between Emily and Pine River.

FREEBORN, MINN.—Plans are under way for the installation of a telephone exchange.

MALONE, MINN.—There is talk of establishing telephone communications between this place and Garnes.

ST. MICHAEL, MINN.—An exchange is to be erected at this place by the Rural Telephone Company.

THIEF RIVER FALLS, MINN.—Many changes and improvements will be made to the local telephone system.

TRACY, MINN.—The Current Lake Telephone Company has extended its line to this place.

RUTHTON, MINN.—A new telephone line is being constructed in this town.

MERIDAN, MISS.—The Home Telephone Company is planning extending its line to Whitfield, Ala., via Teemsuba, Cuba and York.

CHILLICOTHE, MO.—J. F. Malthaner has arrived here to make preliminary survey for the rebuilding of the People's Telephone Company's system. The improvements, which will cost about $4,000, will include a new switchboard of 2,400 lines capacity and will be wired for 900 telephones. C. L. Waite is local manager of the system.

ROLLO, MO.—The Rollo Telephone Company is rebuilding its entire plant in this place.

WEBB CITY, MO.—Superintendent Adams of the Home Telephone Company, states that work on the company's new exchange building will begin shortly after January 1. The entire building will be used for telephone purposes.

CULBERTSON, MONT.—The Montana Star Telephone Company recently connected its line with Plentywood.

DEER LODGE, MONT.—The Montana Independent Telephone Company anticipates having a new exchange completed and in operation in this city within sixty days. All of the material necessary for its construction is either on the ground or in transit. The Deer Lodge exchange will be connected by copper toll lines with other exchanges of the Montana Independent Telephone Company located at Butte, Anaconda, Helena and Missoula.

HAVRE, MONT.—The Dakota Western Telephone Company, which was recently incorporated, will construct a line from Havre to Palermo, N. D.

ITHACA, N. Y.—The Ithaca Telephone Company has begun the construction of a line between this city and Newfield, a distance of eight miles.

JOHNSONVILLE, N. Y.—The Johnsonville Telephone Company expects to extend its lines to Boyntonville early in the spring.

ASHEVILLE, N. C.—The Asheville Telephone and Telegraph Company has ordered for the North Buncombe Telephone Company a complete and modern switchboard which will be installed at Democrat and afford an improved service on this line, which is daily growing in use.

CORONA, N. D.—The Linden-Baech telephone lines will be repaired and rebuilt.

EDGELEY, N. D.—A line which the farmers of Swede township are constructing will make connections with a line of the Pomona Valley Telephone Company.

LEMMON, N. D.—The Montana and Dakota Telephone Company has completed the construction of its line from Lemmon to the Montana line, and is now constructing a branch line from Haynes to Mott, N. D. The company expects to construct a line across the Standing Rock reservation next spring, which will connect with the Dakota Central Telephone Company at Mobridge.

SISSETON, N. D.—The Effington Telephone Company is extending a new line through Grant township.

STARKWEATHER, N. D.—The Farmers' Telephone Company of Starkweather has completed a line to Hampden which will be an important addition to the system.

WAHPETON, N. D.—A. H. Burnson has purchased the five rural telephone lines running out of Wahpeton. He will extend the lines to the surrounding country.

COWETA, OKLA.—The system of the Coweta Telephone Exchange Company is being overhauled under the direction of Manager J. C. Johnson.

KIOWA, OKLA.—J. W. Bell is expending several hundred dollars in repairs and improvements on the Kiowa telephone lines.

NORMAN, OKLA.—E. A. Smith and brother, the new owners of the Norman telephone exchange, announce that they will install a common battery switchboard with 500 lines capacity.

TULSA, OKLA.—The new Citizens' Telephone Company plans to erect a modern two-story exchange building in this city.

KRUMSVILLE, PA.—The Rural Telephone and Telegraph Company is erecting an exchange building at this place.

MEADVILLE, PA.—The Petroleum Telephone Company's new line from Meadville to Titusville is almost completed. The company's business is increasing very satisfactorily, and its service constantly improving.

WAYNESBURG, PA.—At a recent meeting of the stockholders of the Green County Telephone Company, it was decided to expend $50,000 in improvements on the company's lines throughout the county the coming year.

NORMA, S. D.—The Lewis Mutual Telephone Company is erecting a central station at this place and extending its lines for several miles.

PRESHO, S. D.—The Pierre-Presho Telephone Company has purchased the fifteen mile telephone line from Presho to Sylvia, and work will be commenced immediately to extend the line to Lamro, Jordan, Little Crow and the Rosebud Agency.

AMARILLO, TEX.—It is expected that the exchange of the Panhandle Telephone and Telegraph Company in this city, now being installed by H. H. Davenport & Company, will be placed in service the last of the month.

ARANSAS PASS, TEX.—Arrangements have been made with Hon J. P. Gandy of Supply, Okla., to put in an Independent telephone line in the town of Aransas Pass and vicinity.

BALLINGER, TEX.—A telephone system is being installed at Norton, 20 miles northwest of Ballinger, by Dorsey & Company. The system is receiving good patronage and will be in operation soon.

BROWNWOOD, TEX.—The West Texas Telephone Company, which has general offices here, has begun building the new system, the town having outgrown the present system. It expects to spend $30,000. The company will also commence at once the erection of a new home for the exchange on Brown street

TOYAH, TEX.—The local and long distance telephone system owned and operated by A. G. Vanhorn of this place is to be completely reconstructed. The town system will be entirely rebuilt, necessitating the setting of quite a number of new 30-foot and 40-foot poles. When this part of the work is finished, the plant will have a capacity of 150 local telephones. This improvement will be followed by a thorough overhauling of the long distance part of the system to Kent, Balmorhea, Sargosa and Pera, covering some 80 miles of long distance service.

YORKTOWN, TEX.—The Eureka Telephone Company has completed installing its new exchange.

FARMINGTON, UTAH.—The Davis County Independent Telephone Company has begun the construction of pole lines throughout the county. The circuits will be of copper and common battery exchanges will be installed at Farmington, Kaysville, Bountiful and Dayton. It is expected that the exchanges will be in operation by the first of February and that there will be at least 1,000 telephones in service in the county by June 1. Mr. N. B. Stadley of Farmington is manager of the company.

BELLINGHAM, WASH.—It is stated that $50,000 is to be spent in extensions of the lines of the Home Telephone Company in this city.

PROSSER, WASH.—The Benton Independent Telephone Company, the farmers' company, is installing its switchboard and when completed will have one of the best systems in the state. It connects with all the farmers in Horse Heaven, Rattlesnake country and all the ranches up and down the valley.

ALBANY, WIS.—The United Telephone Company has completed its extension south on the east side of the river.

KASSON, WIS.—The extension of the line of the Wayside Farmers' Telephone Company has been completed.

WAUSAU, WIS.—The Wausau Telephone Company is arranging to add greatly to its outside construction during the coming year and has placed an order for 22,000 feet of lead cable of fifty and one hundred pairs. The line from Wausau to Merrill on the west side of the river will be rebuilt and it is contemplated to extend the line from Brokaw to Granite Heights, where it will, in that event, install a toll station. The contemplated improvements will cost the company from $10,000 to $12,000 and will make the total length of cables 87,000 feet.

ALNWICK, ONT., CAN.—At a recent meeting of the directors of the Alnwick Rural Telephone Company, it was decided to proceed with the plans for construction. With the building of this line Northumberland county will be pretty well belted with telephone lines

ELECTIONS.

CLINTON, ILL.—At the annual election of officers of the National Telephone and Electric Company the following were elected: President, B. F. Wasson; secretary, V. R. Wasson. Trustees: V. R. Wasson, B. F. Wasson and S. H. Martin

DU QUOIN, ILL.—The directors of the reorganized Ohio and Mississippi Valley Telephone Company are: A. B. Minton, J. G. Hardy and W. C. Alexander of Murphysboro, R. O. Lehn of Du Quoin, A. J. Phillips of Anna, and C. H. Rottger of Springfield The other two directors will be elected later.

FIATT, ILL.—The Deerfield Central Telephone Company at its annual meeting elected the following officers for the ensuing year: H. A. Francis, president; Thomas Cameron, vice-president; L. P Schrodt, secretary-treasurer; T. J. Knott, Thomas Cameron, Frank Swinger and Joseph Mahr, directors.

BIPPUS, IND.—At a meeting of the stockholders of the Bippus Telephone Company the following officers were elected to serve for the ensuing year: John Storble, president; Adam Schinkle, vice-president; Clarence Eberhart, secretary; Melvin Zent, treasurer; Jacob Lahr, manager.

OWENSVILLE, IND.—At the annual meeting of the Independent Telephone Company P. S. Armstrong was elected president, L. F. Weldon and John D. Thompson were re-elected secretary and treasurer respectively.

FINCHFORD, IA.—The directors of the Finchford Mutual Telephone Company elected at the recent annual meeting are: H. S. Beaty, John Howe, A. P. Baker, H. Gissler, G. W. Miller, A. Vossberg and Frank Dewey.

ROME, IA.—At the annual meeting of the directors of the Rome Telephone Company, Frank Hessendahl was elected president and P. Have, secretary.

SEYMOUR, IA.—At the annual meeting of the stockholders of the Genoa & Seymour Farmers' Telephone Company the following officers were elected for the ensuing year: President, J. C. Phillips; vice-president, G. T. Miller; secretary, B. L. Hoschar; treasurer, S. Bonner. Directors, R. N. Shepherd, W. H. Owen, Geo. Wharton, E. L. Shonts, J. H. Skipper, John Stoner, H. W. Miller.

BANNER, KAN.—The stockholders of Telephone Line No. 39 have elected the following officers for the ensuing year: President, John Bryant; secretary, E. L. Parkhurst; treasurer, Chas. Knouft. Directors: W. A. Nease, M. E. Bryant and E. J. Davis.

CHILES, KAN.—At the recent annual meeting of the Mutual Telephone Company officers were re-elected as follows: C. J. Woods, president; R. S. Williar, vice-president; Walter Crawford secretary; William Gaul treasurer; J. N. Bryce director.

PITTSBURG, KAN.—The officers of the Glendale Rural Telephone Company, which was recenly organized on the Missouri side of the state line, have been selected and the work of construction commenced. The officers are J. B. Johnston, president; Frank Pierpont, secretary, and J. S. Heald, treasurer.

ROLLIN, KAN.—The officers of the Big Creek Rural Telephone Company for the coming year are: President, Will Reinhardt; secretary, John Hand; treasurer, Will Burghart. Trustees: Mr. Taylor, Henry Burghart and Fred Beale.

ST. CLAIR, MICH.—The St. Clair River Telephone Company has elected the following officers: Otis Rankin, president; M. K. Chamberlain, vice-president; Alex. Moore, secretary; and Capt. Parsons, treasurer.

PAYNESVILLE, MINN.—At the annual meeting of the directors of the North Star Telephone Company, A. J. Smithson was elected president; Archie Pelkey, vice-president and H. A. Hendrick, secretary.

PETERSON, MINN.—H. Elstad has been elected president and Chris Johnson, secretary, of the White Star Telephone Company.

BARNESTON, NEB.—At the annual meeting of the Barneston Telephone Company the following officers were elected: President, M. D. Strawn; secretary, Wm. Townsend; treasurer, A. Ehman.

HAMMOND, WIS.—At the annual meeting of the Hammond Telephone Company the following officers and directors were elected: President and treasurer, P. C. Anderson; secretary-manager, Andrew Hope. Directors: George Knipfel, Christ. Hanson, William Jost, Pat McLaughlin, Tim Keating, Pat Casey, L. J. Webster.

MISCELLANEOUS.

PATON, IA.—The office of the Mutual Telephone Company was recently destroyed by fire.

LA HARPE, KAN.—C. S. Stoner of Hartford, Kan., has completed a deal whereby the Hartford telephone exchange, owned by John W. and George A. Fichter, passed into the hands of E. E. Stout of La Harpe.

PROTECTION, KAN.—Henry De Spain has purchased a controlling interest in the Protection Telephone Company and has assumed full charge of the system.

NORTH REDWOOD, MINN.—S. J. Sampson is promoting the extension of a rural telephone system.

MOOREFIELD, NEB.—A. La Bounty, president of the Moorefield Farm and Ranch Telephone Company, has purchased the Farnam Telephone Company of Farnam. The owners of this plant were S. F. Parker, M. C. Divoll and C. L. Dunham of Holdrege. The new management took charge January 1.

BUFFALO, N. Y.—Officials of the Baltimore & Ohio, the New York Central, Gould lines and other roads are considering plans for the installation of the telephone system on a number of their lines instead of the telegraph system, and the Pennsylvania will extend the new method of operating trains during the coming year. All of these lines will include this work in their 1909 construction programme, and it is expected that several hundred miles of railroad will be equipped with the telephone system before this time next year.

UTICA, N. Y.—The telephone line of the Utica division of the D., L. & W. Railroad, which has been in the course of construction during the last summer, has been completed. The line gives the Utica division telephone connection with the Syracuse, Scranton and Buffalo divisions of the road.

SHERWOOD, S. D.—C. H. Budke, president of the Whitney Farmers' line, has purchased the local telephone system.

CAMERON, W. VA.—An agreement has been reached between the Farmers' Mutual and the National Telephone companies whereby the two companies will connect lines. Connections are to be made inside sixty days.

SHEBOYGAN, WIS.—The Citizens' Telephone Company suffered damage estimated at $5,000, in a recent storm.

UNDERGROUND.

OTTAWA, ILL.—It is reported that the Central Union Telephone Company will place a number of its wires in La Salle and Peru underground during the coming year.